

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION



CONSTRUCTION PERMIT

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

RYAN G'SELL INVESTMENTS, LLC
Owner
Twin Pine Estates
4870 Jarvis Road
Hillsboro, MO 63050

for the construction of (described facilities):

See attached.

Permit Conditions:

See attached.

Construction of such proposed facilities shall be in accordance with the provisions of the Missouri Clean Water Law, Chapter 644, RSMo, and regulation promulgated thereunder, or this permit may be revoked by the Department of Natural Resources (department).

As the department does not examine structural features of design or the efficiency of mechanical equipment, the issuance of this permit does not include approval of these features.

A representative of the department may inspect the work covered by this permit during construction. Issuance of a permit to operate by the department will be contingent on the work substantially adhering to the approved plans and specifications.

This permit applies only to the construction of water pollution control components; it does not apply to other environmentally regulated areas.

October 24, 2024
Effective Date

October 23, 2026
Expiration Date



John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

Construction and installation of screening equipment, equalization tank, packaged extended aeration plant, secondary clarifier, aerated sludge holding tank, UV disinfection and effluent flow meter. Sludge will be hauled to another permitted facility when removal is necessary. Design flow is 41,500 gallons per day (gpd).

This project will also include general site work appropriate to the scope and purpose of the project and all necessary appurtenances to make a complete and usable wastewater treatment facility.

II. COST ANALYSIS FOR COMPLIANCE

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

The department is not required to complete a cost analysis for compliance because the facility is not a combined or separate sanitary sewer system for a publically-owned treatment works.

III. CONSTRUCTION PERMIT CONDITIONS

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

1. This construction permit does not authorize discharge.
2. All construction shall be consistent with plans and specifications signed and sealed by Eugene Fribis, P.E. with Fribis Engineering, Inc and as described in this permit.
3. The department must be contacted in writing prior to making any changes to the plans and specifications that would directly or indirectly have an impact on the capacity, flow, system layout, or reliability of the proposed wastewater treatment facilities or any design parameter that is addressed by 10 CSR 20-8, in accordance with 10 CSR 20-8.110(11).

4. State and federal law does not permit bypassing of raw wastewater, therefore steps must be taken to ensure that raw wastewater does not discharge during construction. If a sanitary sewer overflow or bypass occurs, report the appropriate information to the department's St. Louis Regional Office per 10 CSR 20-7.015(9)(G).
5. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of one acre or more to obtain a Missouri state operating permit to discharge stormwater. The permit requires best management practices sufficient to control runoff and sedimentation to protect waters of the state. Land disturbance permits will only be obtained by means of the department's ePermitting system available online at <https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-mogem>. See <https://dnr.mo.gov/data-e-services/water/electronic-permitting-epermitting> for more information.
6. A United States Army Corps of Engineers (USACE) Clean Water Act Section 404 Department of the Army permit and a Section 401 Water Quality Certification issued by the department may be required for the activities described in this permit. This permit is not valid until these requirements are satisfied or notification is provided that no Section 404 permit is required by the USACE. You must contact your local USACE district since they determine what waters are jurisdictional and which permitting requirements may apply. You may call the department's Water Protection Program, Operating Permits Section at 573-522-4502 for more information. See <https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/section-401-water-quality> for more information.
7. All construction must adhere to applicable 10 CSR 20-8 (Chapter 8) requirements listed below.
 - Flood protection shall apply to new construction and to existing facilities undergoing major modification. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the 100-year flood elevation. 10 CSR 20-8.140 (2) (B)
 - Unless another distance is determined by the Missouri Geological Survey or by the department's Public Drinking Water Branch, the minimum distance between wastewater treatment facilities and all potable water sources shall be at least 300 feet. 10 CSR 20-8.140 (2) (C) 1.
 - Facilities shall be readily accessible by authorized personnel from a public right-of-way at all times. 10 CSR 20-8.140 (2) (D)
 - The outfall shall be so constructed and protected against the effects of flood water, ice, or other hazards as to reasonably ensure its structural stability and freedom from stoppage. 10 CSR 20-8.140 (6) (A)

- All sampling points shall be designed so that a representative and discrete 24-hour automatic composite sample or grab sample of the effluent discharge can be obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters. 10 CSR 20-8.140 (6) (B)
- All outfalls shall be posted with a permanent sign indicating the outfall number (i.e., Outfall #001). 10 CSR 20-8.140 (6) (C)
- All wastewater treatment facilities shall be provided with an alternate source of electric power or pumping capability to allow continuity of operation during power failures. 10 CSR 20-8.140 (7) (A) 1.
- Electrical systems and components in raw wastewater or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors that are normally present, shall comply with the NFPA 70 *National Electric Code (NEC)* (2017 Edition), as approved and published August 24, 2016, requirements for Class I, Division 1, Group D locations. 10 CSR 20-8.140 (7) (B)
- An audiovisual alarm or a more advanced alert system, with a self-contained power supply, capable of monitoring the condition of equipment whose failure could result in a violation of the operating permit, shall be provided for all wastewater treatment facilities. 10 CSR 20-8.140 (7) (C)
- No piping or other connections shall exist in any part of the wastewater treatment facility that might cause the contamination of a potable water supply. 10 CSR 20-8.140 (7) (D) 1.
- A means of flow measurement shall be provided at all wastewater treatment facilities. 10 CSR 20-8.140 (7) (E)
- Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility:
 - Fencing. Enclose the facility site with a fence designed to discourage the entrance of unauthorized persons and animals; 10 CSR 20-8.140 (8) (A)
 - Gratings over appropriate areas of treatment units where access for maintenance is necessary; 10 CSR 20-8.140 (8) (B)
 - First aid equipment; 10 CSR 20-8.140 (8) (C)
 - Posted “No Smoking” signs in hazardous areas; 10 CSR 20-8.140 (8) (D)
 - Appropriate personal protective equipment (PPE); 10 CSR 20-8.140 (8) (E)
 - Portable blower and hose sufficient to ventilate accessed confined spaces; 10 CSR 20-8.140 (8) (F)
 - 10 CSR 20-8.140 (8) (G) Portable lighting equipment complying with NEC requirements. See subsection (7)(B) of this rule;
 - 10 CSR 20-8.140 (8) (H) Gas detectors listed and labeled for use in NEC Class I, Division 1, Group D locations. See subsection (7)(B) of this rule;

- Appropriately-placed warning signs for slippery areas, non-potable water fixtures (see subparagraph (7)(D)3.B. of this rule), low head clearance areas, open service manholes, hazardous chemical storage areas, flammable fuel storage areas, high noise areas, etc.; 10 CSR 20-8.140 (8) (I)
- All wastewater treatment facilities must have a screening device, comminutor, or septic tank for the purpose of removing debris and nuisance materials from the influent wastewater. 10 CSR 20-8.150 (2)
- All screening devices and screening storage areas shall be protected from freezing. 10 CSR 20-8.150 (4) (A) 1.
- Provisions shall be made for isolating or removing screening devices from their location for servicing. 10 CSR 20-8.150 (4) (A) 2.
- Manually cleaned screen channels shall be protected by guard railings and deck gratings with adequate provisions for removal or opening to facilitate raking. 10 CSR 20-8.150 (4) (A) 3. A. (I)
- Effective flow splitting devices and control appurtenances (*e.g.* gates and splitter boxes) shall be provided to permit proper proportioning of flow and solids loading to each settling unit, throughout the expected range of flows. 10 CSR 20-8.160 (2) (B)
- Overflow weirs shall be readily adjustable over the life of the structure to correct for differential settlement of the tank. 10 CSR 20-8.160 (3) (C) 1.
- Walls of settling tanks shall extend at least 6 inches above the surrounding ground surface and shall provide not less than 12 inches of freeboard. 10 CSR 20-8.160 (3) (E)
- Safety features shall appropriately include machinery covers, life lines, handrails on all stairways and walkways, and slip resistant surfaces. For additional safety follow the provisions listed in 10 CSR 20-8.140(8). 10 CSR 20-8.160 (5) (A)
- The design shall provide for convenient and safe access to routine maintenance items such as gear boxes, scum removal mechanism, baffles, weirs, inlet stilling baffle areas, and effluent channels. 10 CSR 20-8.160 (5) (B)
- For electrical equipment, fixtures, and controls in enclosed settling basins and scum tanks, where hazardous concentrations of flammable gases or vapors may accumulate, follow the provisions in 10 CSR 20-8.140(7)(B). The fixtures and controls shall be conveniently located and safely accessible for operation and maintenance. 10 CSR 20-8.160 (5) (C)
- Aerobic Solids Digestion High Level Emergency Overflow. An unvalved emergency overflow shall be provided that will convey digester overflow to the treatment plant headworks, the aeration process, or to another liquid sludge storage facility and that has an alarm for high level conditions. 10 CSR 20-8.170 (5)

- For solids pumping systems, audio-visual alarms shall be provided in accordance with 10 CSR 20-8.140(7)(C) for:
 - Pump failure; 10 CSR 20-8.170 (6) (A)
 - Pressure loss; 10 CSR 20-8.170 (6) (B) and
 - High pressure. 10 CSR 20-8.170 (6) (C)
 - The UV dosage shall be based on the design peak hourly flow, maximum rate of pumpage, or peak batch flow. 10 CSR 20-8.190 (5) (A) 1.
 - If no flow equalization is provided for a batch discharger, the UV dosage shall be based on the peak batch flow. 10 CSR 20-8.190 (5) (A) 2.
 - The UV system shall deliver the target dosage based on equipment derating factors and, if needed, have the UV equipment manufacturer verify that the scale up or scale down factor utilized in the design is appropriate for the specific application under consideration. 10 CSR 20-8.190 (5) (A) 3.
 - The UV system shall deliver a minimum UV dosage of 30,000 microwatt seconds per centimeters squared ($\mu\text{W} \cdot \text{s}/\text{cm}^2$). 10 CSR 20-8.190 (5) (A) 4.
 - Open channel UV systems. The combination of the total number of banks shall be capable of treating the design peak hourly flow, maximum rate of pumpage, or peak batch flow. 10 CSR 20-8.190 (5) (B) 1.
 - The UV system must continuously monitor and display at the UV system control panel the following minimum conditions:
 - The relative intensity of each bank or closed vessel system; 10 CSR 20-8.190 (5) (C) 1. A.
 - The operational status and condition of each bank or closed vessel system; 10 CSR 20-8.190 (5) (C) 1. B.
 - The ON/OFF status of each lamp in the system; 10 CSR 20-8.190 (5) (C) 1. C. and
 - The total number of operating hours of each bank or each closed vessel system. 10 CSR 20-8.190 (5) (C) 1. D.
 - The UV system shall include an alarm system. Alarm systems shall comply with 10 CSR 20-8.140(7)(C). 10 CSR 20-8.190 (5) (C) 2.
8. Upon completion of construction:
- A. The Jefferson County Public Sewer District will become the continuing authority for operation and maintenance of these facilities;
 - B. Submit an electronic copy of the as built if the project was not constructed in accordance with previously submitted plans and specifications; and

- C. Submit the Statement of Work Completed form to the department in accordance with 10 CSR 20-6.010(5)(N) (<https://dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155>) with a request to issue the operating permit.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

A new 225 lot, single-family home subdivision endorsed by the City of Hillsboro is to be constructed along Jarvis Road, Hillsboro MO. A treatment system is being constructed on-site because the subdivision is more than 5 miles from the nearest treatment plant capable of accepting the flows to be generated. The cost of regionalization was not economically feasible. The domestic flows from the 225 new homes will flow via gravity to the Twin Pine Estates WWTF. This construction permit is for phase one of two, designed for 41,500 gpd, half of the final built-out design flow.

2. FACILITY DESCRIPTION

The Twin Pine Estates WWTF is a new discharging treatment facility located at 4870 Jarvis Road, City of Hillsboro, in Jefferson County, Missouri. The facility has a design average flow of 41,500 gpd and serves a hydraulic population equivalent of approximately 415 people. Flows will be entirely domestic. The new treatment system consists of headworks screening, an extended aeration unit, secondary clarifiers, return and waste activated sludge lines, aerated sludge storage, UV disinfection, flow measurement, and post aeration. Once construction is complete the Jefferson County Public Sewer Department will become the owner and continuing authority of the treatment plant.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet final effluent limits as established in the Antidegradation review dated May 20, 2024, and revised June 13, 2024.

The limits following the completion of construction will be applicable to the facility:

Parameter	Units	Monthly average limit
Biochemical Oxygen Demand ₅	mg/L	20
Total Suspended Solids	mg/L	30
Ammonia as N-summer	mg/L	0.6
Ammonia as N-winter	mg/L	1.2
pH	SU	6.5-9.0
<i>E. coli</i>	#/100mL	206

4. ANTIDegradation

The department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated May 20, 2024 and revised June 24 2024, due to the new discharge to Sandy Creek. See **APPENDIX – ANTIDegradation**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

- Flow Measurement – Installation of accurate flow measurement devices will give the treatment facility a means of improved data analysis.
 - Electromagnetic Meter – An effluent electromagnetic 4-inch flow meter shall measure the secondary treated and disinfected wastewater flow through the 4-inch weir prior to discharge at Outfall No. 001.
- Screening – Installation of screening devices removes nuisance inorganic materials from raw wastewater.
 - Manual Coarse Bar Screen – The manual coarse bar screen will have clear bar spacings of 2-inch and be positioned at an angle of 45 degrees from the horizontal to allow for manual raking of the screen. The screen is sized for a peak flow of 0.103 MGD.
- Extended Aeration Package Plant – Installation of one DPI Solutions 41.5k pdg expandable extended aeration package plant capable of treating a design average flow of 41,500 gpd. The following components are integrated into the pre-cast steel package plant:
 - Flow Equalization – A flow equalization chamber with a volume of 28,500 gallon will be provided. Aeration by means of one blower with 5 HP motors capable of supplying 215 scfm each to 48 fine bubble diffusers with a capacity of 4.5 scfm per diffuser. Duplex flow equalization pumps that transfer wastewater to the first aeration chamber. The flow equalization chamber has a gravity emergency overflow to the aeration chamber.
 - Aeration Chambers – 12 ft by 49 ft by 9.5 feet sidewater depth aeration chambers operating means of a transfer pipe with a total volume of 41,423 gal will be provided. The design peak flow is 0.103 MGD based on the expected attenuation of flows from the equalization basin. Aeration by means of two 10 hp blowers capable of supplying 215 scfm each to 75 coarse bubble diffusers per chamber with a capacity of 4.5 scfm per diffuser. The aeration chambers are designed for an average daily loading of 70.8 lbs BOD₅. A transfer pipe and elbow allows wastewater from the second aeration chamber to move by gravity to the clarifier.
 - Sludge Holding Chamber – The sludge holding chamber will have a volume of 17,054 gallons. The aeration chamber blowers will supply air to the 30 fine bubble diffusers with a capacity of 4.5 scfm per

diffuser. Supernatant will be decanted by means of an adjustable surface skimming airlift to the aeration chamber. Sludge removal shall be by contract hauler.

- Secondary Clarifier – One secondary clarifier will be constructed with a total surface area of 113 sf at the 0.103 MGD peak for a peak surface loading of 367 gpd/sf. Average detention time will be 4 hours, with the peak detention time being 2.3 hours. The clarifiers will have a 12 ft diameter which will allow for a design average surface overflow of 1,000 gpd/sf, and a peak of 1,500 gpd/sf. The sidewater depth will be 12 ft. The weir loading rate is 6,958 gpd/lf which meets the requirements of 10 CSR 20-8.160(3)(C)2 of being less than 10,000 gpd/lf. The solids loading rate is 19.3 lbs/day/sf which meets the requirements of 10 CSR 20-8.160(3)(B)3 of less than 35 lbs/day/sf at peak flow.
- Disinfection – Disinfection is the process of removal, deactivation, or killing of pathogenic microorganisms.
 - Open Channel Ultraviolet (UV) – An open channel, gravity flow, low pressure high intensity UV disinfection system capable of treating a peak flow of 208,000 gpd while delivering a minimum UV intensity of 30 mJ/cm² with an expected ultraviolet transmissivity of 65 percent or greater. The single open channel UV system consists of one banks with one modules per bank and 8 lamps per module. The disinfected effluent will flow by gravity through flow measurement equipment and to Outfall No. 001.
- Post Aeration –
 - Cascade – To increase dissolved oxygen in the effluent, step cascade aeration will be provided prior to the outfall headwall at the Sandy Creek.
- Emergency Power – The Jefferson County Public Sewer District owns both a portable diesel generator and multiple pump trucks. The district would have time to respond, due to the flow equalization basin, and provide generator power. If the outage continued wastewater could be hauled to another treatment plant.
- Return Activated Sludge (RAS). The RAS rate is 50-100 percent of the design average flow, 0.0207-0.0415 MGD. The RAS MLSS is expected to be 3,000-5,000 mg/L. There will be 2 pumps, 1 operational and 1 standby.

6. OPERATING PERMIT

This facility does not meet the requirements of the MOGD issued on July 1, 2024, for the following reason: BOD₅ and TSS effluent limits.

The Twin Pine Estates WWTF was successfully public noticed from September 13 to October 14, 2024, with no comments received. Submit the Statement of Work Completed to the department in accordance with 10 CSR 20-6.010(5)(N) and request the operating permit modification be issued.

V. NOTICE OF RIGHT TO APPEAL

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Section 621.250 RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal should be directed to:

Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: <https://ahc.mo.gov>

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APPENDIX

- **Antidegradation**

Water Quality and Antidegradation Review

For the Protection of Water Quality
Performance Based Discharge Level Determination for

Twin Pine Estates WWTF

Requested by

Eugene Fribis, P.E.

Fribis Engineering, Inc

For

Twin Pine Estates WWTF

RYAN G'SELL INVESTMENTS, LLC

March 2024

Revised: June 2024

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1. PURPOSE OF ANTIDegradation REVIEW REPORT

An Antidegradation Review Request was submitted by Fribis Engineering, Inc. on behalf of Ryan G'sell Investments, LLC for the Twin Pine Estates WWTF to evaluate construction of a wastewater treatment facility to serve 225 new single-family homes. The construction will take place over two phases with the first phase designed to treat 41,500 gallons per day (gpd) and the second to treat 83,250 gpd at full build-out. If the timeline for full build-out exceeds 2 years, a new WQAR may be required to address changes in regulation and water quality. The preferred alternative is a packaged extended aeration treatment plant which will be under the continuing authority of the Jefferson County Public Sewer District once construction is completed. A discharging system was chosen based on the amount of available land and lack of regionalization options in the area.

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

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

- facility assimilative capacity for any pollutant as a result of any single discharge;
 - segment assimilative capacity for any pollutant as a result of all discharges combined after existing water quality (EWQ); or
 - any new or expanded discharge that the department determines will likely result in the increased accumulation of pollutants or their degradation products in sediment or fish tissue,
- then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required.

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

The base case treatment technology is a packaged extended aeration. The receiving waterbody is an unnamed tributary of Sandy Creek. The proposed design flow is 41,500 gpd during phase 1 of construction. Depending on the speed at which houses are occupied, phase 2 is expected to be constructed within 2-4 years and will have a total

design flow of 83,250 gpd. If the timeline for full build out exceeds two years, a new WQAR may be required to address changes in regulation and water quality.

The following is a review of the *Anti-Degradation Report for Twin Pine Estates Sewage Treatment Facility* prepared by Fribis Engineering, Inc. dated February 4, 2024, with revisions May 7, 2024.

2. PERFORMANCE CONCENTRATION BASIS

Table 2-1: Performance Based Levels

PARAMETER	Unit	Basis	Monthly Average
Flow	MGD		*
BOD ₅	mg/L	TBEL	20
TSS	mg/L	TBEL	30
<i>Escherichia coli</i> **	#/100mL	WQBEL	206**
Ammonia as N		TBEL	
1st Quarter (Jan-March)	mg/L		1.2
2nd Quarter (April-June)			0.6
3rd Quarter (July-Sept)			0.6
4th Quarter (Oct-Dec)			1.2
PARAMETER	Unit	Basis for Limits	Minimum/Maximum
pH	SU	FSR	6.5/9.0

* - Monitoring requirement only

** - #/100mL; the Monthly Average for *E. coli* is a geometric mean.

*** - Parameter not previously established in previous state operating permit.

Basis for Limitations Codes:

MDEL – Minimally Degrading Effluent Limit TBEL – Technology-Based Effluent Limit

NDEL – Non-Degrading Effluent Limit WQBEL – Water Quality-Based Effluent Limit

PEL – Preferred Effluent Limit FSR – Federal or State Regulation

3. FACILITY INFORMATION

The proposed facility is a new discharger to serve a 225-home subdivision that is being developed along Jarvis Road in Jefferson County. The effluent is entirely domestic, and the design flow is 41,500 gpd during phase 1 and 83,250 gpd during phase 2. Depending on the speed at which houses are occupied, phase 2 is expected to be constructed within 2-4 years and will have a total design flow of 83,250 gpd. If the timeline for full build out exceeds 2 years, a new WQAR may be required to address changes in regulation and water quality.

Facility Name:	Twin Pine Estates WWTF
Address:	4870 Jarvis Road, Hillsboro 63050
Permit #:	MO-0140627
County:	Jefferson
Facility Type:	Domestic POTW
Owner:	RYAN G'SELL INVESTMENTS, LLC
Continuing Authority:	Jefferson County Public Sewer District
Sec. of State Charter No:	LC014355231
UTM Coordinates:	X = 715098 Y = 4238496 15S
Legal Description:	T41N R04E S23
12-digit watershed:	07140101-0803
Ecological Drainage Unit:	Ozark Highlands

A. FACILITY PERFORMANCE HISTORY:

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

B. NATURAL HERITAGE REVIEW

A Missouri Department of Conservation Natural Heritage Review was obtained by the applicant. No species on the Missouri Endangered Species list was found to be in the project area. The following recommendations were made for construction activities:

- Manage construction to minimize sedimentation and run-off to nearby streams.

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

C. GEOHYDROLOGIC EVALUATION

A Geohydrologic Evaluation was submitted with the request and the receiving stream is gaining for discharge purposes (see Appendix B). In the event of a treatment failure the nearby shallow groundwater and surface water of Sandy Creek may be adversely impacted.

4. RECEIVING WATERBODY INFORMATION

A. RECEIVING WATERBODY

Table 4-1: Outfalls Table

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
001 (phase 1)	0.06	Secondary	Domestic
001 (phase 2)	0.13	Secondary	Domestic

Table 4-2: Receiving Stream(s)

WATER-BODY NAME	CLASS	WBI D	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Tributary to Sandy Creek	-	-	General Criteria	071401010803	0.23
Sandy Creek	C	1720	AHP-WWH, WBC-B, SCR, HHP, IRR, LWP, HHP	071401010803	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 4-3: Receiving Stream Segments

Receiving Water Body Segment Outfall #1:		
Upper end segment* UTM coordinates:	X = 715098; Y = 4238496	outfall
Lower end segment* UTM coordinates:	X = 714610; Y = 4239112	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.

B. MIXING CONSIDERATIONS AND LOW FLOW VALUES

The proposed receiving waterbody is a tributary of Sandy Creek, which is a class C stream. The applicant elected to use USGS StreamStats to establish low flow values. See Appendix D for StreamStats summary.

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

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

MIXING CONSIDERATIONS

Mixing Zone: Not Allowed [10 CSR 20-7.031(5)(A)4.B.(I)(a)].

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

C. EXISTING WATER QUALITY

No existing water quality data was submitted. The facility discharges to a tributary of Sandy Creek.

D. RECEIVING WATER MONITORING REQUIREMENTS

No receiving water monitoring requirements recommended at this time.

5. ANTIDegradation REVIEW INFORMATION

A. TIER DETERMINATION

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

Tier 1 protection is applied to a waterbody on a pollutant-by-pollutant basis for pollutants which may cause or contribute to the impairment of a beneficial use or violation of Water Quality Criteria (WQC); and prohibit further degradation of Existing Water Quality (EWQ) where additional pollutants of concern (POCs) would result in the water being included on the 303(d) List. According to the AIP, the waters may receive the POCs that are causing impairments if 1) the discharge would not cause or contribute to a violation of the WQS, 2) all other conditions of the state permitting requirements are met (i.e., no discharge options are explored and technology based requirements (including ELGs) are met); and 3) the permit is issued with the highest statutory and regulatory requirements.

- No Tier 1 pollutants were identified for this waterbody.

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

- Tier 2 Pollutants for this review include: biochemical oxygen demand (BOD), total suspended solids (TSS), ammonia, oil and grease, and pH.

Tier 3 protection prohibits any degradation of water quality of Outstanding National Resource Waters and Outstanding State Resource Waters as identified in Tables D and E of the Water Quality Standards (WQS).

Temporary degradation of water receiving Tier 3 protection may be allowed by the department on a case-by-case basis as explained in Section VI of the AIP.

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

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

Table 5-1: Pollutants of Concern and Tier Determinations

Pollutants of Concern	Tier	Review Type	Comment
Biological Oxygen Demand (BOD ₅)	2*	Significant	
Total Suspended Solids (TSS)	**	Significant	
Ammonia as N	2*	Significant	
<i>Escherichia coli</i> (<i>E. coli</i>)	2*	Significant	Disinfection required, UV proposed
pH	***	Significant	10 CSR 20-7.015(8)(A)2 applied

* Tier assumed.

** Tier determination not possible: No in-stream standards for these parameters.

*** Standards for these parameters are ranges.

B. NECESSITY OF DEGRADATION

The AIP specifies that if the proposed activity does result in a reduction by 10 percent or more of the assimilative capacity then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required. Part of that analysis as shown below is the evaluation of non-degrading alternatives, such as regionalization or no discharge systems.

The applicant has the option of assuming discharge will result in a reduction by 10 percent or more of the assimilative capacity and proceeding directly to the alternatives analysis, thereby avoiding the determination of the assimilative capacity of the receiving water. The applicant has elected this option.

i. REGIONALIZATION

Regionalization was considered and found to be impracticable. The nearest POTW is the City of Hillsboro North WWTF. The plant would require approximately 4,224 linear feet (lf) of force main and a pump station to convey the flows from the subdivision to the plant. The total cost estimate for this was \$200,000 for required materials, not considering easements. Both the Hillsboro North WWTF and Sandy Branch WWTF are within about a mile of the project area but lack capacity to accept additional flows and would require upgrades to accept the flows from Twin Pine Estates.

ii. NO DISCHARGE EVALUATION

No discharge was considered and found to be impracticable. A USDA soils survey was included that indicates over 75 percent of the land is unsuitable for land application with most of the suitable soil being in the center of the development. Based on a soil application rate of 2 ft/yr, the required land area is ~350 acres, and the total project area is only 102 acres. There is not enough space onsite or nearby to land apply at reasonable rates, especially after the necessary setbacks. In addition, pretreatment would be required making this option economically inefficient.

iii. ALTERNATIVES TO NO DISCHARGE

i. ALTERNATIVE #1: BASE CASE

An extended aeration packaged plant was considered for the base case in this analysis. This option would include influent screening, flow equalization, an aeration basin, secondary clarifier, alum dosing with tertiary filtration, UV disinfection, and electronic flow monitoring. This option was considered due to the familiarity with operators and the plants ability to function while properties are being developed. This report was revised to include 20 mg/L BOD₅ and 30 mg/L TSS to reflect the manufacture's identified treatment level for the base case scenario. A Streeter-Phelps model was conducted to ensure no in-stream dissolved oxygen impairment.

ii. ALTERNATIVE #2:

An extended aeration cast-in-place plant was considered as well. The report states that both extended aeration options are preferred, and the final decision will come down to cost bids. This option also includes influent screening, flow equalization, an aeration basin, secondary clarifier, alum dosing with tertiary filtration, UV disinfection, and electronic flow monitoring. This option would require less setup and similarly it would be able to provide treatment as the subdivision is built out and sold.

iii. ALTERNATIVE #3:

A recirculating media filter packaged plant was considered for this project. The Orenco AdvanTex plant contains a baffled primary settling tank with a pre-aeration section, recirculating filter bed, and alum dosing with tertiary filtration for phosphorus removal, as well as UV disinfection and electric flow monitoring. Each AdvanTex AX100 Unit is rated for 5,000 gpd, so approximately 20 units would be required for this project. This is not the preferred alternative due to associated costs and limited availability of support from Oregon manufacturer.

iv. ALTERNATIVE #4:

A Parkson Eco-Cycle Sequencing Batch Reactor (SBR) was evaluated as part of this review. This option would include a flow equalization tank followed by the treatment tank. In the treatment tank BOD₅ removal and nitrification/denitrification is done via aeration timers, and TSS is settled out at the end of the cycle. Alum dosing and a tertiary filter would be required for phosphorus removal. UV disinfection and electric flow monitoring would also be included. This option was found infeasible due to the recent increase in cost and difficulty to find parts. In addition, due to the reliance on computer monitoring and timers there is a large potential for treatment to become inefficient over time, especially without an expert SBR operator.

v. ALTERNATIVE #5:

A membrane bioreactor (MBR) was evaluated as part of this review due to its ability to treat to tighter water quality limits. The MBR plant is an aeration chamber containing suspended media to encourage microbial growth. A primary settling tank, aerated treatment tank, and tertiary filter would be required, followed by flow measurement and UV disinfection. Sludge would need to be removed from the primary tank occasionally. This option was not preferred due to the unfamiliarity with local operators, poor factory support, cost associated, and the inconsistency that these plants exhibit during development build-out before design flow is reached.

Table 5-2: Alternatives Analysis Comparison

Pollutant	Alternative 1 (Base Case) Extended Aeration Packaged Plant	Alternative 2 Extended Aeration Cast-in-Place	Alternative 3 Fixed Film Bioreactor	Alternative 4 Sequencing Batch Reactor	Alternative 5 Membrane Bioreactor
BOD ₅	≤ 20 mg/l	≤ 20 mg/l	≤ 10 mg/l	≤ 10 mg/l	≤ 10 mg/l
TSS	≤ 30 mg/l	≤ 30 mg/l	≤ 10 mg/l	≤ 10 mg/l	≤ 10 mg/l
Ammonia as N	≤ 0.6 mg/l	≤ 0.6 mg/l	≤ 0.6 mg/l	≤ 0.6 mg/l	≤ 0.6 mg/l
<i>Escherichia coli</i> (<i>E. coli</i>)	≤ 126 CFU/100ml	≤ 126 CFU/100ml	≤ 126 CFU/100ml	≤ 126 CFU/100ml	≤ 126 CFU/100ml
Nitrogen, Total	*	*	*	*	*
Life Cycle Cost**	\$1,946,397	\$2,036,585	\$2,179,707	\$2,952,295	\$3,419,478
Ratio	1	1.05	1.12	1.52	1.76

* Monitoring requirement

** Life cycle cost at 20-year design life and 5.5 percent interest

C. SOCIAL AND ECONOMIC IMPORTANCE

The affected community consists of the residents of Hillsboro and the surrounding Jefferson County area. This subdivision is located just outside the City of Hillsboro,

which is experiencing a lack of housing for daytime commuters. The daytime population of Hillsboro is nearly double the permanent residents, meaning many people live in other areas of Jefferson and St. Louis counties and commute to Hillsboro daily. The City of Hillsboro is encouraging housing developments to stimulate new commercial business in the area. The addition of single-family housing in this area will bring new students to the school districts, new taxpayers to the community, more commerce for the downtown businesses, and fill jobs in the area. In total, gains to the community through taxes, property values, and revenue were calculated to be approximately \$90,000,000. The treatment system will be developed with no cost to the Jefferson County Public Sewer District (JCPSD), who will become the Continuing Authority once construction is complete. The JCPSD will bear the cost of operation and maintenance, which for the selected alternative, is expected to total ~\$300,000 over 20 years. This may be covered by new connections and increased user rates for JCPSD. Downsides to this project include increased storm water runoff due to new impermeable surfaces, road usage and wear, and demands for utility repair in the immediate area.

Administrative Unit	Hillsboro City	Missouri State	United States
Population (2022)	3,467	6,154,422	331,097,593
Percent Change in Population (2000-2022)	107.0%	10.0%	17.7%
2022 Median Household Income (in 2023 Dollars)	\$61,355	\$68,634	\$78,242
Percent Change in Median Household Income (2000-2022)	-9.0%	-1.1%	1.9%
Median Age (2022)	30.5	38.8	38.8
Change in Median Age in Years (2000-2022)	-0.7	2.7	3.5
Unemployment Rate (2022)	7.7%	4.3%	5.3%
Percent of Population Below Poverty Level (2022)	12.7%	12.8%	12.5%
Percent of Household Received Food Stamps (2022)	19.2%	10.0%	11.5%
(Primary) County Where the Community Is Located	Jefferson County		

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

Wasteload allocations and limits were calculated using two methods:

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

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

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

Where C = downstream concentration

C_s = upstream concentration

Q_s = upstream flow

C_e = effluent concentration

Q_e = effluent flow

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

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

- B. Alternative Analysis-based** – Using the preferred alternative's treatment capacity for conventional pollutants such as BOD₅ and TSS that are provided by the consultant as the WLA, the performance based effluent average monthly and average weekly limits are determined by applying the WLA as the average monthly (AML) and multiplying the AML by 1.5 to derive the average weekly limit (AWL).

Note: Performance based effluent limits have been based on the authority included in Section I.A. of the AIP. Also under 40 CFR 133.105, permitting authorities shall require more stringent limitations than equivalent to secondary treatment limitations for 1) existing facilities if the permitting authority determines that the 30-day average and 7-day average BOD₅ and TSS effluent values could be achievable through proper operation and maintenance of the treatment works, and 2) new facilities if the permitting authority determines that the 30-day average and 7-day average BOD₅ and TSS effluent values could be achievable through proper operation and maintenance of the treatment works, considering the design capability of the treatment process.

Outfall #001 – Main Facility Outfall

- **Flow.** Though not limited itself, the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations [40 CFR Part 122.44(i)(1)(ii)]. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the department, which may require the submittal of an operating permit modification. Influent monitoring has been and will be required for this facility in its Missouri State Operating Permit.
- **Biochemical Oxygen Demand (BOD₅).** Effluent limits of 20 mg/L average monthly and 30 mg/L average daily maximum were established as a result of a discharging technology alternatives analysis conducted by the applicant. These limits are at least as stringent as the minimum effluent regulations established in 10 CSR 20-7.015(8)(A). Influent monitoring will be required to determine percentage removal per 40 CFR Part 133.
- **Total Suspended Solids (TSS).** Effluent limits of 30 mg/L average monthly and 45 mg/L average daily maximum were established as a result of a discharging technology alternatives analysis conducted by the applicant. These limits are at least as stringent as the minimum effluent

regulations established in 10 CSR 20-7.015(8)(A). Influent monitoring will be required to determine percentage removal per 40 CFR Part 133.

- **Escherichia coli (E. coli).** Effluent limits of 126 CFU per 100 mL monthly average and 630 CFU per 100 mL as a weekly average of geometric mean during the recreation season (April 1 – October 31) were established as a result of a discharging technology alternatives analysis conducted by the applicant. Twin Pine Estates will utilize UV for disinfection and therefore will not contribute to impairment of the WBC-B designated use of the receiving stream, as per 10 CSR 20-7.031(5)(C). An effluent limit for both monthly average and weekly maximum is required by 40 CFR 122.45(d) for POTWs.
- **Total Ammonia Nitrogen.** Performance based effluent levels were established as a result of a discharging technology alternatives analysis conducted by the applicant.

Alternative analysis performance-based levels are:

Parameter	Units	AML
Ammonia as N-summer	mg/L	0.6
Ammonia as N-winter	mg/L	1.2

To verify that the proposed alternative analysis performance-based levels provided by the facility are protective of the water quality based effluent limits, below is the following calculation of water quality based effluent limits. It demonstrates that the proposed alternative analysis performance-based levels proposed by the applicant are more protective.

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

Table 6-1: Ammonia Criteria as of February 2024

Quarter	Temp (°C)*	pH (SU)*	Total Ammonia Nitrogen CCC (mg/L)	Total Ammonia Nitrogen CMC (mg/L)
1st Quarter (Jan-March)	11.0	7.9	3.1	12.1
2nd Quarter (April-June)	21.2	7.8	2.0	12.1
3rd Quarter (July-Sept)	26.0	7.8	1.5	12.1

4th Quarter (Oct-Dec)	15.5	7.8	2.9	12.1
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* Ecoregion Data (Ozark Highlands)

1st Quarter (January- March)

Chronic WLA: $C_e = ((0.128 + 0.0)3.1 - (0.0 * 0.01)) / 0.128 = 3.1 \text{ mg/L}$

Acute WLA: $C_e = ((0.128 + 0.0)12.1 - (0.0 * 0.01)) / 0.128 = 12.1 \text{ mg/L}$

2nd Quarter (April – June)

Chronic WLA: $C_e = ((0.128 + 0.0)2.0 - (0.0 * 0.01)) / 0.128 = 2.0 \text{ mg/L}$

Acute WLA: $C_e = ((0.128 + 0.0)12.1 - (0.0 * 0.01)) / 0.128 = 12.1 \text{ mg/L}$

3rd Quarter (July- September)

Chronic WLA: $C_e = ((0.128 + 0.0)1.5 - (0.0 * 0.01)) / 0.128 = 1.5 \text{ mg/L}$

Acute WLA: $C_e = ((0.128 + 0.0)12.1 - (0.0 * 0.01)) / 0.128 = 12.1 \text{ mg/L}$

4th Quarter (October- December)

Chronic WLA: $C_e = ((0.128 + 0.0)2.9 - (0.0 * 0.01)) / 0.128 = 2.9 \text{ mg/L}$

Acute WLA: $C_e = ((0.128 + 0.0)12.1 - (0.0 * 0.01)) / 0.128 = 12.1 \text{ mg/L}$

Table 6-2: Comparison of WQBEL and Performance Based Levels

Quarter	Quarterly Average Limit	
	WQBEL (mg/L)	PBL (mg/L)
Q1	3.1	1.2
Q2	2.0	0.6
Q3	1.5	0.6
Q4	2.9	1.2

- **Oil & Grease.** Conventional pollutant, [10 CSR 20-7.031(4)(B)]. Waters shall be free from oil, scum, and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses.
- **pH.** The preferred alternative selected for ammonia treatment serves as the base case for pH with effluent limit range of 6.5-9.0 SU. No mixing zone is allowed due to the classification of the receiving stream, therefore the water quality standard must be met at the outfall.
- **Biochemical Oxygen Demand (BOD₅) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to BOD₅ and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85 percent removal efficiency for BOD₅.
- **Total Suspended Solids (TSS) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to BOD₅ and TSS for

Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85 percent removal efficiency for TSS.

7. GENERAL ASSUMPTIONS OF THE WATER QUALITY AND ANTIDegradation REVIEW

- A. A Water Quality and Antidegradation Review (WQAR) assumes that [10 CSR 20-6.010(2) Continuing Authorities and 10 CSR 20-6.010(4)(A)5.B., consideration for no discharge] has been or will be addressed in a Missouri State Operating Permit or Construction Permit Application.
- B. A WQAR does not indicate approval or disapproval of alternative analysis as per [10 CSR 20-7.015(4) Losing Streams], and/or any section of the effluent regulations.
- C. Changes to Federal and State Regulations (FSR) made after the drafting of this WQAR may alter Water Quality Based Effluent Limits (WQBEL).
- D. Effluent limitations derived from FSR may be WQBEL or Effluent Limit Guidelines (ELG).
- E. WQBEL supersede ELG only when they are more stringent. Mass limits derived from technology-based limits are still appropriate.
- F. A WQAR does not allow discharges to waters of the State, and shall not be construed as a National Pollution Discharge Elimination System (NPDES) or Missouri State Operating Permit to discharge or a permit to construct, modify, or upgrade.
- G. Limitations and other requirements in a WQAR may change as Water Quality Standards (WQS), Methodology, and Implementation procedures change.
- H. Nothing in this WQAR removes any obligations to comply with county or other local ordinances or restrictions.
- I. The operating permit may contain additional requirements to evaluate the effectiveness of the technology once the facility is in operation. This Antidegradation Review is based on the information provided by the facility and is not a comprehensive review of the proposed treatment technology. If the review engineer determines the proposed technology will not consistently meet proposed effluent limits, the permittee will be required to revise their Antidegradation Report.

8. ANTIDegradation REVIEW PRELIMINARY DETERMINATION

The proposed new facility discharge location will result in a reduction by 10 percent or more of the pollutant assimilative capacity of the unnamed tributary to Sandy Creek. Construction of a prefabricated packaged extended aeration plant was chosen as the preferred alternative due to its ability to meet water quality limits and the familiarity operators in the area have with this type of plant. Non discharging alternatives including regionalization and land application were found impracticable due to distance to suitable land or neighboring collection systems with adequate flow available. The other discharging treatment alternatives were also found impracticable due to difficulty to service and operate, except for alternative two which would be chosen if found to be more cost effective at the time of construction bids.

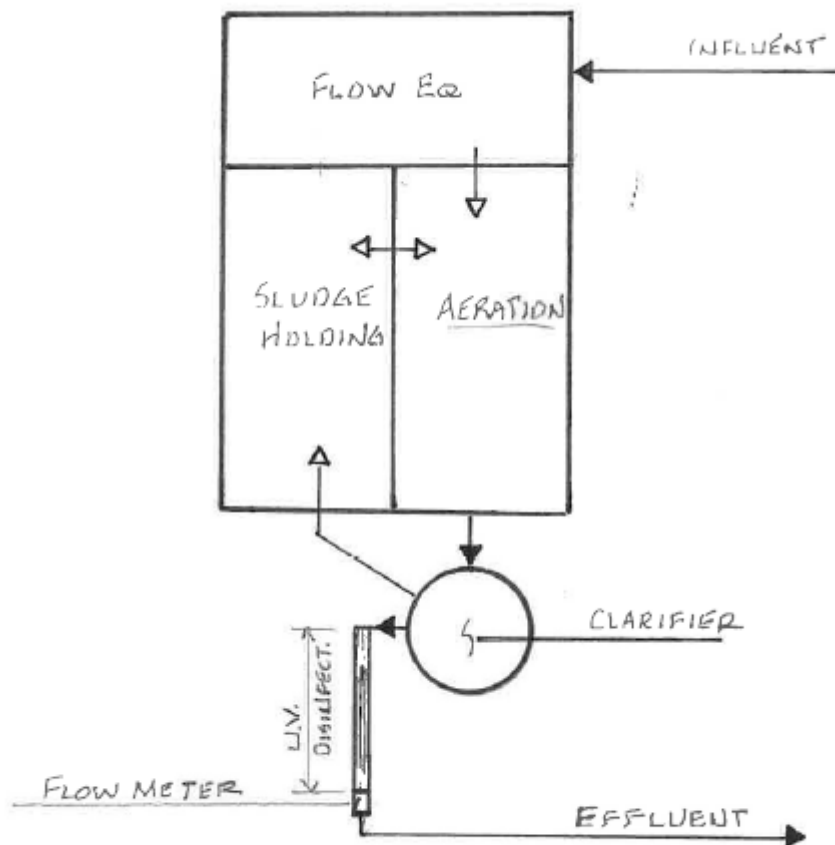
Design flow for this project is 41,500 gpd during phase 1. A dissolved oxygen model was submitted and determined that at phase 1 design flow, and at the design flow anticipated during phase 2, DO levels in the receiving stream will not be impaired. Design flow for phase 2 is 83,250 gpd. In general, Antidegradation Reports are only applicable for 2 years. Depending on the speed at which houses are occupied, phase 2 is expected to be constructed within 2-4 years and will have a total design flow of 83,250 gpd. If the timeline for full build out exceeds 2 years, a new WQAR may be required to address changes in regulation and water quality.

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

Reviewer: Alex Bielefeldt
Date: March 2024

Reviewer: Cailie Carlile, P.E

- **Process Flow Diagram**



- **Summary of Design**

This project will provide sewage treatment for a proposed subdivision consisting of 225 single family homes. The treatment facility will be placed in a common ground area at the low point of the subdivision. All sewers will flow by gravity to the new treatment plant.

The sewer system and sewage treatment facilities will be sized to serve an average daily flow of 83,250 gpd of domestic wastewater based on 370 gallons per day per residence. The organic loading is based on 0.22 pounds per day per capita (832 persons at 225 homes x 3.7 persons per home). Therefore, the total organic load will be 183.15 pounds BOD per day. These numbers reflect the final population of the subdivision.

This plant will be built in two phases of 41,500 gpd for each phase. The first phase will be constructed in the summer of 2024. The second and final phase will be constructed in 2026 or 2027 depending on home sales over the next two years. However, to facilitate the tank placement in the second phase of construction, the flow equalization tank will be built for the ultimate capacity in the first phase of construction. For similar reasons, the sludge holding tank will be built for the ultimate 83,250 gpd capacity during the first phase of construction.