



S.S. PAPADOPULOS & ASSOCIATES, INC.
ENVIRONMENTAL & WATER-RESOURCE CONSULTANTS

June 27, 2021

Pat Naugle, President
Watershed Alliance of Adams County
Box 4329
Gettysburg, Pennsylvania 17325

Subject: Application by Petrus Holding, Inc. to Install a Drip Irrigation Micro-Mound System at 355 Swamp Creek Lane, Hamiltonban Township, Adams County -- DEP Code # A3-01918-215-2

Dear Mr. Naugle

I have reviewed the above referenced application submitted on behalf of Petrus Holdings to install a Shallow Limiting Zone Drip Micro-mound system. In addition, I visited the property and the adjacent Swamp Creek with members of the Watershed Alliance on June 10, 2021.

My major concern regarding the proposed micro-mound system is the potential impact on the water quality and aquatic biota of the adjacent Swamp Creek, a designated Exceptional Value Waters. The application materials I reviewed do not discuss the presence of nearby Exceptional Value Waters, and clearly do not address potential effects on the Exceptional Value Waters even though Swamp Creek is only about 500 feet to the west of the proposed micro-mounds. Refer to attached map illustrating the proximity of the proposed micro-mounds to Swamp Creek.

The application materials note that *“There were no sites suitable for standard bed or elevated sand mound bed. Soil-based treatment is preferred over stream discharge.”*¹ The site is clearly not suitable for a standard system as water table is shallow and the soils are the Ravenrock-Highfield-Rock outcrop complex. I also agree that soil-based treatment is preferred over stream discharge, but it is essential to recognize that some constituents in the effluent to be applied to the micro-mounds will undergo no or little soil-based treatment prior to discharge, via groundwater, to the nearby Swamp Creek. As recently recognized by the U.S. Supreme Court, liquid waste discharged via groundwater can be functionally equivalent to a direct discharge.² The characteristics of the hydrologic system near the proposed micro-mounds are such that all of the sewage effluent applied

¹ Source is the “Alternative Analysis for Petrus Holdings, Inc., Place of Worship 355 Swamp Creek Ln., Hamiltonban Township, Adams County, PA”, Robert Bressler, Soil Services Company, Inc., April 22, 2021, page 1.

² *County of Maui v. Hawaii Wildlife Fund*, 140 S. Ct. 1462, 2020.

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to the micro-mounds will eventually discharge to Swamp Creek. Thus, the 2,000 gallons per day of effluent applied to the micro-mounds will result in 2,000 gallons per day of additional discharge to Swamp Creek.

Groundwater at the locations of the proposed micro-mounds is shallow. Test borings advanced at the proposed locations determined that the seasonally high water table is within one foot of land surface. During my site visit on June 10th, I noted a seep on Swamp Lane along the western property line, indicating that water table is indeed very shallow at the proposed locations of the micro-mounds, which are located adjacent to Swamp Lane. A picture I took of the seep at 11:43 am is shown to the right. A concern is that sewage effluent applied to the micro-mounds will have a short-circuited pathway to surface water.



The characteristics of Swamp Creek are such that it is truly a stream of Exceptional Value Waters. The Watershed Alliance routinely monitors Swamp Creek. Based on monthly water-quality samples collected during the past year, average concentrations of nitrate, sulfate, and phosphate were 1.6 mg/L, 2.8 mg/l, and 0.2 mg/L, respectively. The pH ranged from 7.5 to 8.1, and specific conductance averaged 64 μ S/cm. Assessments of macroinvertebrates using the Rapid Bioassessment Protocols have consistently resulted in scores about 92 percent. The proposed micro-mounds are located near the headwaters of this groundwater fed stream, which is vulnerable to degradation.

The use of the micro-mound system will increase the nutrient loading to Swamp Creek. Based on the standard assumption of 45 mg/L of nitrogen in sewage effluent, and limited degradation within the system, the use of the micro-mounds will result in the addition of over 250 pounds per year of nitrogen to Swamp Creek, increasing nitrogen concentrations in the creek, particularly in the sensitive low-flow periods. In addition to nitrogen, many other constituents in foods, medications and cleaning products used in residential and worship settings will be disposed into the sewage system and applied as effluent to the micro-mounds. Constituents that do not degrade or only partially degrade in systems of this type include a variety of food additives, pharmaceuticals, organic solvents, and inorganic compounds.³ These constituents will all discharge to Swamp Creek. Many of these compounds have the potential to effect the biota in Swamp Creek.

³ A recent study of compounds in septic systems is Schaidler, L., J. Ackerman, R. Rudel, "Septic systems as sources of organic wastewater compounds in domestic drinking water wells in a shallow sand and gravel aquifer." Science of the Total Environment. 2015.12.081.

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The antidegradation requirements in Pennsylvania Code 25§93.4a state that “*The water quality of Exceptional Value Waters shall be maintained and protected*”. The use of a micro-mound system for sewage effluent disposal will, in my opinion, result in degradation of Swamp Creek.

I am a Senior Principal at the consulting firm S.S. Papadopoulos & Associates, Inc. My expertise is the transport and fate of constituents in groundwater and groundwater-surface water interactions. I have been involved with matters involving the contamination of groundwater by septic systems for over 40 years. My initial work on septic systems was as a graduate student investigating the effects of septic systems on lake water quality in the Midwest and I have continued to be involved with septic system issues throughout my professional career.

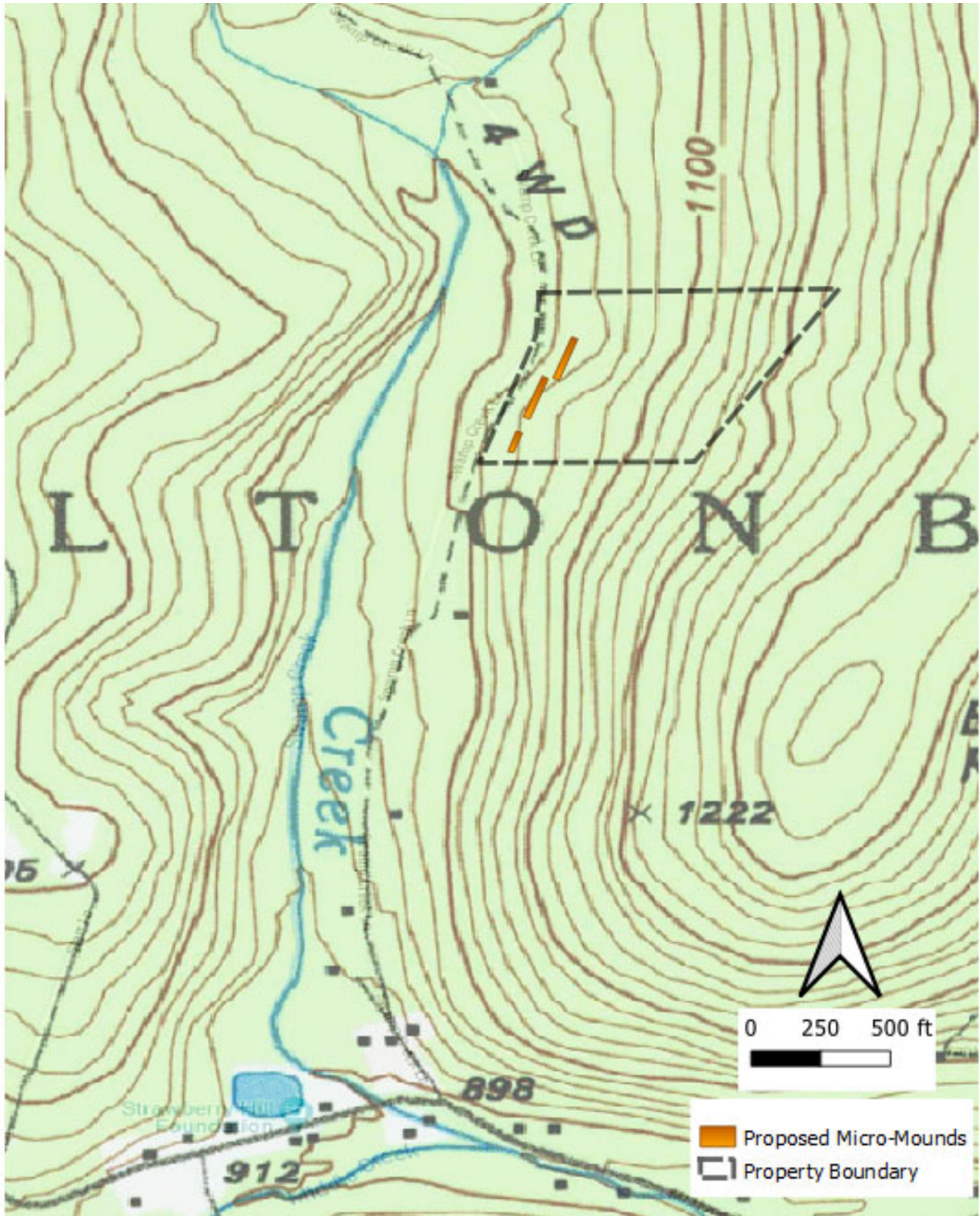
Sincerely,

S. S. PAPANOPULOS & ASSOCIATES, INC.

A handwritten signature in blue ink that reads "Charles B Andrews".

Charles B. Andrews, Ph.D.

Senior Principal



Petrus Holdings, Inc. Property at 355 Swamp Creek Lane with Proposed Location of Micro-Mounds for Sewage Treatment