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ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

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KENTUCKY DIVISION OF WATER
WELLHEAD PROTECTION PLAN
5-YEAR UPDATE FORM

Update Requirements:

This form should be used for the 5-year update submittal requirements of the Kentucky Wellhead Protection Program (WHPP) in compliance with 401 KAR 4:220 and SDWA Section 1428. Once the form is complete, please sign and send to:

Kentucky Division of Water
Watershed Management Branch
Attention: Dale Booth
300 Sower Boulevard, 3rd Floor
Frankfort, Kentucky 40601 or dale.booth@ky.gov

For assistance, contact Dale Booth at (502) 782-6895 or dale.booth@ky.gov

System Information:

PWS Name: **Pine Mountain Settlement School**

PWS ID Number: **KY0483135**

AI Number: **33911**

Contact Person/Title: **Kiristen Webb, PMSC Staff or Theodore "TJ" Falce, Water Plant Manager**

Mailing Address: **36 Highway 510 Bledsoe, KY 40810**

Telephone: **(606) 558-3571 or (606) 505-7737** Email:

kiristen@pinemountainsettlementschool.com or tj@pinemountainsettlementschool.com

System Type*: **NTNC**

*Community; Non-Transient/Non-Community; Transient/Non-Community

Source*: **Unnamed Spring** *Well(s) or Spring(s) and total number of each

AKGWA #(s): **90000087**

County: **Harlan**

ADD: **CVADD**

WWD Permit #: **NA; Under 10,000 gpd** Permitted Amount (mgd): **NA; 0.004-0.005 average withdrawal**

Population Served: **Residential: 45**

Overall Susceptibility Rating*: **Medium** *High, Medium or Low

WHPP Changes Summary: **Pine Mountain Settlement School withdraws its source water from an impounded spring that originates from the Mississippian Newman Limestone along Pine Mountain in the southeastern part of the Eastern Coal Field. Current average monthly water withdrawals are between 0.0004 and 0.0005 MGD which does not meet the 10,000 gallon per day requirement for a permit. The WHPA delineation includes approximately 180 acres of mostly forested land use owned by the school with 2 potential contaminants including a road and septic tanks. The overall susceptibility rating is medium. Pine Mountain Settlement School management strategies include best management practices within the wellhead protection area and outreach and education for residents and visitors of the school.**

Update Form Instructions:

Please complete each section that applies to any system or WHPP updates and submit the supporting documentation. Please indicate if a section is not applicable to this update. **Sections 4 and 6 through 11 are required for every 5-year update.**

Please sign the certification on the last page upon completion.

Section Updates:

Section 1: Treatment Plant

If the treatment plant location has changed then provide a new location map below. This can be a county roadmap or a GIS-produced map. Please use the area below to provide relevant details, or to indicate that no change has occurred.

The treatment plant is still located behind the school campus along the northern slopes of Pine Mountain in Harlan County. The treatment plant utilizes a biosand filter called a Schmutzdecke (German) which is layer of trapped matter at the surface of a slow sand filter in which a dense population of microorganisms develops. These microorganisms within the film or mat feed on and break down incoming organic material trapped in the mat. In doing so, the microorganisms both remove organic matter and add mass to the mat, further developing the mat and increasing the physical straining action of the mat. This treatment is followed the addition of chlorine before going to the storage tank nearby.

Section 2: Water Withdrawal and Water Quality

If there have been changes in water withdrawal rates or water quality since the last submittal, provide a discussion of the relevant details in the space below (include new Water Withdrawal Permit Number if applicable). Include supporting documentation as an attachment.

Pine Mountain Settlement School is in the Eastern Coal Field physiographic region of Kentucky and the overthrust fault has brought the Mississippian Newman Limestone to the surface along Pine Mountain in the southeastern part of the coal field. The massive limestone of the lower part of the Newman Limestone is commonly well exposed in steep, north-facing slopes of Pine Mountain. The lower member is composed principally of limestone with lesser dolomite and shale, and minor amounts of siltstone and sandstone. The spring originates from this geological makeup along the steep, north-facing slopes of Pine Mountain and is impounded downstream by a limestone dam to create a water supply reservoir. One of the most important structures at the Pine Mountain Settlement School, this main water source has been consistent in its supply of some of the best limestone spring water in the area. A National Historic Landmark, Pine Mountain Settlement School was founded in 1913 as a school for children in the commonwealth's remote southeastern mountains and a social center for surrounding communities.

The reservoir was begun in 1916 and work continued until its final completion in 1918. Italian stone mason Luigi Zande was brought to Pine Mountain to construct this stone reservoir which is still in use. Mr. Philip Norcross, an engineer from Atlanta, agreed to provide pro bono advice and details on building a reservoir and septic tanks for the new school. After its completion Zande stayed at the school, teaching stone masonry to many local citizens, helping construct many of the campus buildings including the chapel, and eventually marrying Ethel de Long, one of the school's founders. The reservoir was the gift of Mrs. Mary Emery of Cincinnati. In 1931 the structure was reworked to remedy problems with seepage and structural cracks, but it has performed its duties now for over 100 years. The spring for Pine Mountain Settlement School forms one of the headwaters of Isaac Creek which runs through campus.

Water Withdrawal Permit #0302 was issued for the unnamed spring to Pine Mountain Settlement School in June of 1966 for 0.07 MGD. The production from the spring sustained a population of 180 people on campus which included classrooms, restrooms, lunchroom and kitchen, maintenance shop, pool, and farm. During this period average withdrawals were reportedly 0.06 MGD and maximum withdrawals were 0.07 MGD. In 1975 the population was documented to be 75 people. However, by 1995 less than 0.01 MGD was being used so the permit was inactivated. Today, Pine Mountain hosts programs, workshops, camps that provide instruction in environmental education, Appalachian culture, and crafts to students and adults. It once served as a boarding school for young Kentuckians; its residence and dining halls and other buildings still host visitors and events throughout the year, including wildflower and fall color weekends.

According to the 2018 Report on the Condition of Ambient Groundwater in Kentucky which analyzed monitoring network data, the Eastern Coal Field showed no trends for field measures (conductivity, pH, temperature, conductivity), metals, hardness, major inorganic ions, but showed decreasing trends for orthophosphate (Report on the Condition of Ambient Groundwater in Kentucky 2018).

Section 3: Change or Modification to Groundwater Source

If the system has changed or modified the wells or springs being used, provide the following: 1) a description of changes/modifications; 2) copies of the relevant form(s) (Kentucky Water Well Record, Well Maintenance & Plugging Record, Well Inspection Form or Spring Inventory Record); and 3) any other information relating to well construction (i.e., installation logs, driller's logs, lithological or geophysical logs), below.

No changes or modifications have been made to the spring since the last update in 2019. The unnamed spring is impounded by a limestone dam to form a 125,000-gallon reservoir and there is a 35,000-gallon water tank for finished water.

Section 4 (REQUIRED): Planning Team

Effective water supply protection requires community involvement and public awareness. Identify the planning team consisting of a leader and at least two team members, with their respective titles, below.

Leader:

Theodore "TJ" Falce, Water Plant Manager

Team Members:

Kiristen Webb, PMSS Staff

Jason Brashear, Interim Director

Section 5: WHPA Delineation

If the system is revising a Wellhead Protection Area (WHPA) delineation, or if a new groundwater source has been added since the last submittal, provide a site-specific description of the local geology and aquifer. Include references for published literature. Provide a summary of any aquifer tests (i.e. pumping tests, slug tests, tracer tests), including data gathering and evaluation methods. Show calculations and supporting data for each WHPA delineated or revised. Include the detailed hydrogeologic report as an attachment.

The delineated WHPA for spring for Pine Mountain Settlement School is 179.89 acres and most of it is characterized as mountainous, steep terrain, with narrow ridge tops and numerous rock outcroppings; completely forested, primarily in hardwoods. However, there is some low intensity and open space development within the northwestern portion of the protection area around the campus and roads. The campus is located on 625 acres on the north side of Pine Mountain, the most imposing geological feature of the southern Appalachian Mountains. The wooded slopes of Pine Mountain's property are home to an impressive number of plants and animals, some of which are exclusive to the campus. Kentenia State Forest runs along the southeastern portion of the delineated protection area along 1679/Little Shepherd Trail which is owned by Kentucky Division of Forestry.

Section 6 (REQUIRED): WHPA Map

Provide a WHPA map that shows each groundwater source labeled with the appropriate AKGWA #, all protection zones identified and the Contaminant Source Inventory (CSI) point locations. If no changes have occurred since the last submittal, then a copy of the most recent WHPA/CSI map can be resubmitted. To view the most recent delineations for your system, please visit the [Source Water Protection Viewer](#). Please contact program staff for assistance.

See attached WHPA Map. The WHPA has not been modified since the last update in 2019.

Section 7 (REQUIRED): Contaminant Source Inventory

Provide an updated CSI in table format. This can be created using the spreadsheet template provided, and copied into the space below. If no changes occurred since the last update, the table can be pulled from previous WHPP documents. Each contaminant source listed should have a Contaminant Source ID # that corresponds to the WHPA map in Section 6. The CSI table must show the susceptibility determination ranking for each contaminant source. Include a brief narrative discussion of the overall system susceptibility. For more information on potential sources of contamination, please visit the DOW's [Web Tools for SWP Planning website](#). Please contact program staff for assistance.

See attached CSI. There are 2 potential types of contaminants that have been identified within the WHPA including a county road and septic tanks that serve the campus. There are several septic systems on the campus that serve individual buildings, but only three are within the protection area. The overall susceptibility rating is medium.

Section 8 (REQUIRED): Management Strategies

Provide a discussion of the previous and newly proposed management strategies to prevent source water contamination. This discussion must include the previous management strategies that were implemented as well as the goals that were met. Next, include any NEWLY proposed management strategies, associated goals, implementation plans and the party responsible for implementation. For information about wellhead protection strategies please visit the DOW's [Source Water Protection Strategies website](#).

Previous Management Strategy Update:

Previous strategies included:

- **Posting source water protection signs along roadways (Little Shepherd Trail/1679)**
- **Planning team members monitoring the designated area along Little Shepherd Trail/1679 on a weekly basis for any threats to the water source**
- **Planning team members educating the public regarding source water protection**
- **Informing all employees of PMSS of management strategies and encouragement of reporting any potential threat to the water source**

Newly Proposed Management Strategies:

Pine Mountain Settlement School will continue to use the same management strategies as

outlined in the last update.

Section 9 (REQUIRED): Contingency and WHP Planning

Provide a description of Contingency and WHP Planning. Complete the Emergency Response Phone List, Procedures for Public Notification, identification of Potential Future Problems and the procedures to establish Alternative Water Supplies. This section must also address how often the WHPP will be reviewed and updated.

Emergency Response Phone List

Fill in all Blanks and Phone Numbers with appropriate information.

Local Emergency Response	Phone Number
Plant Operator/TJ Falce	(606) 505-7737
Bledsoe Fire Department	(606) 558-3211
Harlan County Sheriff's Office	(606) 337-3102
Harlan County Emergency Management	(606) 573-6082
Kentucky State Police - Post 10	(606) 573-3131
Local Emergency Dispatch 911	911

State and Federal Assistance	Phone Number
Kentucky DOW (Frankfort)	(502) 564-3410
Kentucky DOW Associated Field Office (FO) London Regional Office	(606) 330-2080
Kentucky Environmental Response Team 24 hour response line	(502) 564-2380 (800) 928-2380
Kentucky State Fire Marshall	(502) 573-0382

Any Other Pertinent Contacts	Any Other Pertinent Numbers
Pine Mountain Settlement School	(606) 558-3571
Kentucky Rural Water Association (KRWA)	(270) 843-2291

Procedures for Public Notification:

In the event of a water system emergency that would threaten the health or life of the public, use the following procedure. Prepare and broadcast an advisory, including directions for the public. Describe the public notification process and provide contacts for those media outlets. If the system uses methods other than traditional media please list them.

The following news sources will be contacted as soon as possible after contacting and notifying Kentucky Division of Water.

Newspaper, Television, and Radio Stations	Phone Numbers
Pine Mountain Settlement School https://www.pinemountainsettlementschool.com/	(606) 558-3571

Potential Future Problems:

Describe the *most likely* scenarios that could threaten the water supply.

The most likely scenario of contamination is from Little Shepherd Trail /1679 which apparently has little travel and is mostly for sightseeing and hiking and part of the Kentucky Division of Forestry’s Kentenia State Forest. The remaining potential contaminants within the protection area, which include septic tanks, are all below the elevation of the spring which is reportedly at 1760 feet in elevation.

Alternative Water Supply (Short and Long Term):

Describe the short term and long-term water supply alternatives that address each of the potential future problems identified above. List all current interconnections with other water systems. Discuss the capacity of each potential alternative water supply to sustain normal operations.

Long-term contingency plans may include treatment modifications or purchasing from Black Mountain Utility District- Green Hills Water District, which has a 6” water line main running along State Highway 221 and a 4” water line main running along State Highway 510. Short-term contingency plans may include boil water advisory and encouraging conservation practices.

Schedule for Update and Review:

The Wellhead Protection Plan will be reviewed regularly and updated every five years as required by regulation.

Section 10 (REQUIRED): Copies of Public Notices and Education Materials

Provide copies of wellhead protection public notices and education materials distributed.

The WHPP update will be emailed to facility and staff of the campus will be posted in public locations throughout campus.

Section 11 (REQUIRED): Public Meeting Documentation***

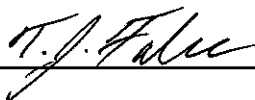
Provide the record of WHPP public meeting attendance, minutes and comments.

A copy of this wellhead protection plan will be emailed to school faculty and staff and be posted in public location throughout campus to fulfill public notification requirements. A copy of the email will be provided in the attachments for documentation.

***Non-Community Water Systems are not required to have public meetings for 5-year updates, but must post a public notice in a conspicuous place. A public notice template is provided as a separate document. However, public input and associated documentation are encouraged. Please contact program staff if you have any questions.

Certification Signature (TO BE COMPLETED BY PLANNING REPRESENTATIVE):

"I certify that this document and all attachments were prepared under my direction or supervision. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete."

Signature:  T.J. Falce Date: 09/24/2024

Printed Name/ Theodore J Falce Theodore J Falce

Assistance:

For any assistance, please contact Wellhead Protection Staff:

Dale Booth
(502) 782-6895
Dale.Booth@ky.gov

Allan Shingleton
(502) 782-6907
Allan.Shingleton@ky.gov

Please sign and return completed form to:

Kentucky Division of Water
Watershed Management Branch
Attention: Chip Zimmer
300 Sower Boulevard, 3rd Floor
Frankfort, Kentucky 40601
or Dale.Booth@ky.gov

Pine Mountain Settlement School - Source Inventory 04.2024



Forested Land Use Typical of the Wellhead Protection Area



Reservoir of Unnamed Spring Source, Limestone Dam Built 1916-1918



Reservoir of Unnamed Spring Source. AKGWA #9000087



Historic Unnamed Spring Reservoir (1930) (<https://pinemountainsettlement.net/>)



Historic Unnamed Spring Reservoir Below Dam (<https://pinemountainsettlement.net/>)



Unnamed Spring Run. AKGWA #9000087



Historic Unnamed Spring Run (<https://pinemountainsettlement.net/>)



Historic Unnamed Spring Run (1940) (<https://pinemountainsettlement.net/>)

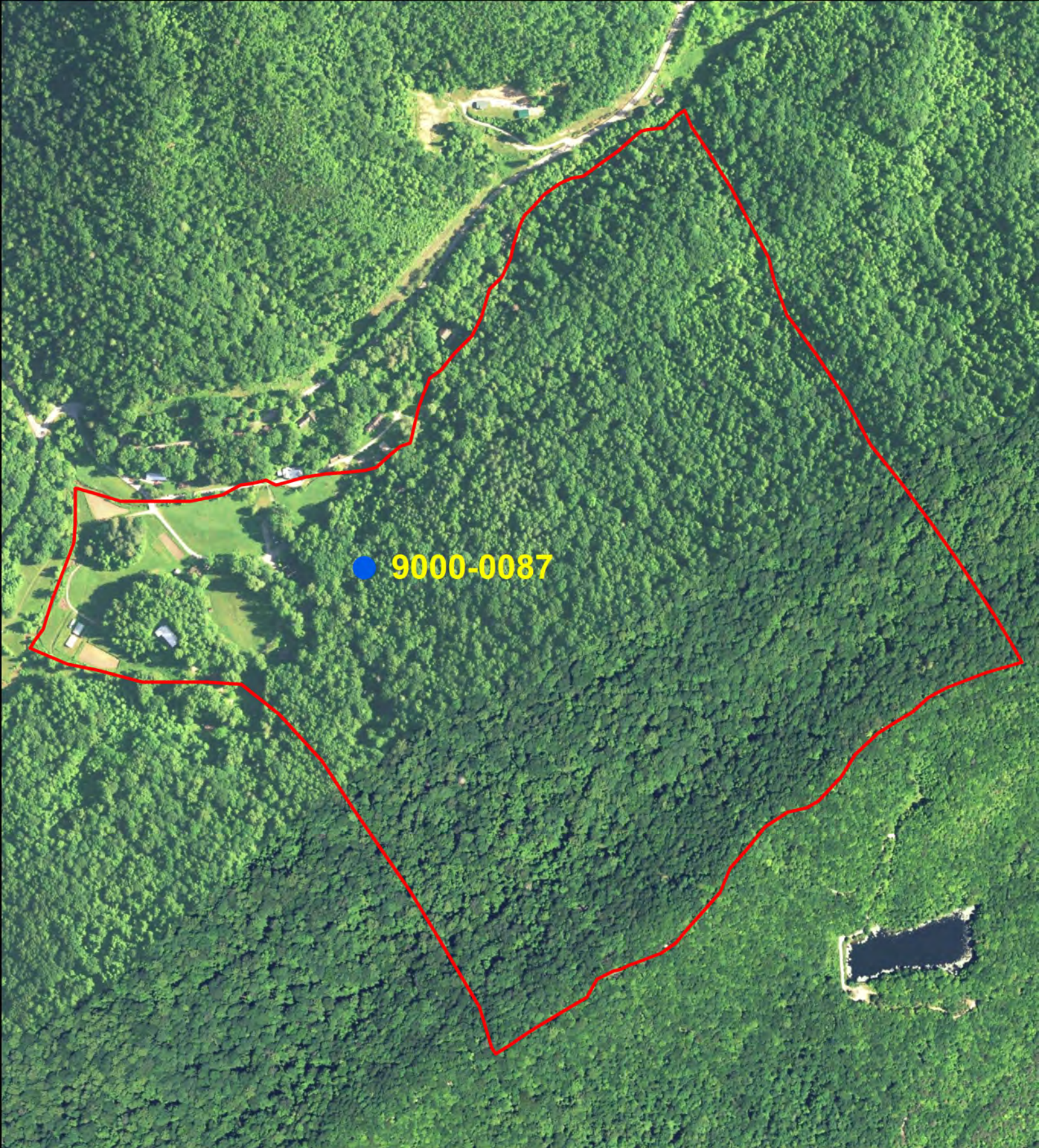


Septic System on campus of Pine Mountain Settlement School







Land use typical on campus of Pine Mountain Settlement School

Section 6: WHPA Map




Pine Mountain Settlement School WHPA

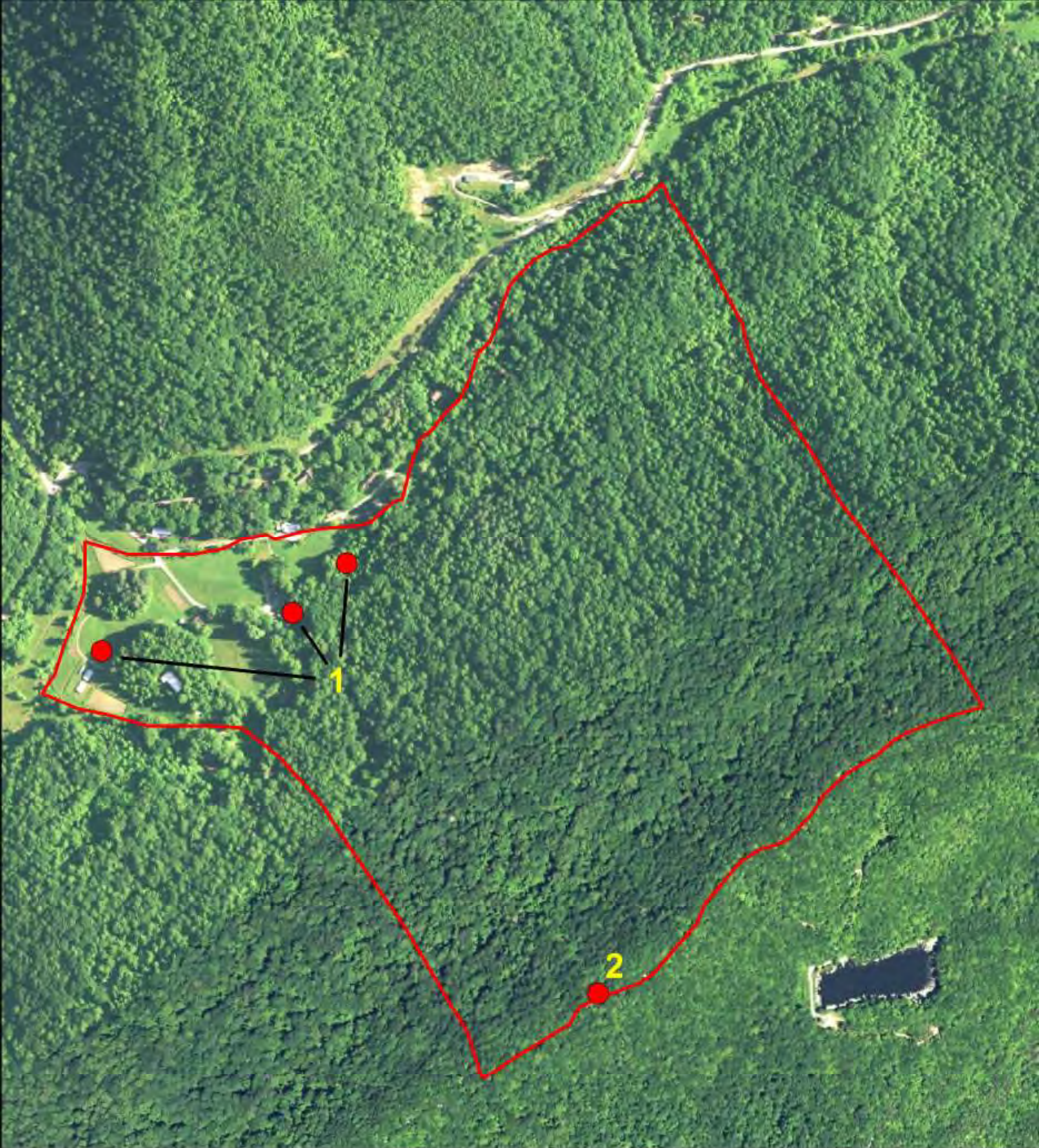
-  Zone 1: 180 day time of travel
-  Zone 2: 10 year time of travel
-  Zone 3: Hydrologic boundary
-  PWS spring



0 500 1,000 Feet



Section 7: Contaminant Source Inventory



Pine Mountain Settlement School CSI

-  Zone 1: 180 day time of travel
-  Zone 2: 10 year time of travel
-  Zone 3: Hydrologic boundary
-  Potential contaminant source

N



0 500 1,000 Feet

Contaminant Source Inventory and Susceptibility Analysis for *Pine Mountain Settlement School*

Contaminant Source ID #	Contaminant Source/Land Use	Address	Quantity	WHPA	Proximity Ranking	Contaminant Value	Hydrologic Sensitivity	Numeric Rating	Susceptibility Ranking
1	Septic Tank	36 Highway 510, Bledsoe, KY 40810	3	1	3	2	3	15	Medium
2	County Road 1679	36 Highway 510, Bledsoe, KY 40810	1	1	3	2	3	12	Medium
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
						Totals:	High	Med	Low
								2	

After the Wellhead Protection Area is delineated the system performs an inventory of all of the potential contaminant sources within the designated area. The aquifer is assigned a hydrologic sensitivity ranking and each source is assigned a proximity ranking and contaminant value. A rankings use a scale from 1-3 (1 represents the lowest hydrologic sensitivity ranking, WHPA-3, and the lowest contaminant value). The numeric ranking is determined using the equation $\text{Numeric Ranking} = (\text{Proximity Ranking} \times 2) + (\text{Contaminant Value} \times 3) + \text{Hydrologic Sensitivity}$. The susceptibility ranking is assigned to each source based on the numeric ranking: $< 10 = \text{Low}$, $10-15 = \text{Medium}$, $> 15 = \text{High}$.

Section 10 & 11: Public Notice Documentation

From: [Curtis Cox](#)
To: staff@pinemountainsettlementschool.com
Cc: c.brantley@krwa.org
Subject: PMSS Wellhead protection plan
Date: Tuesday, October 8, 2024 9:46:55 AM
Attachments: [IMG_1679.HEIC](#)
[IMG_1680.HEIC](#)
[PMSS2024 Wellhead Protection Plan.pdf](#)

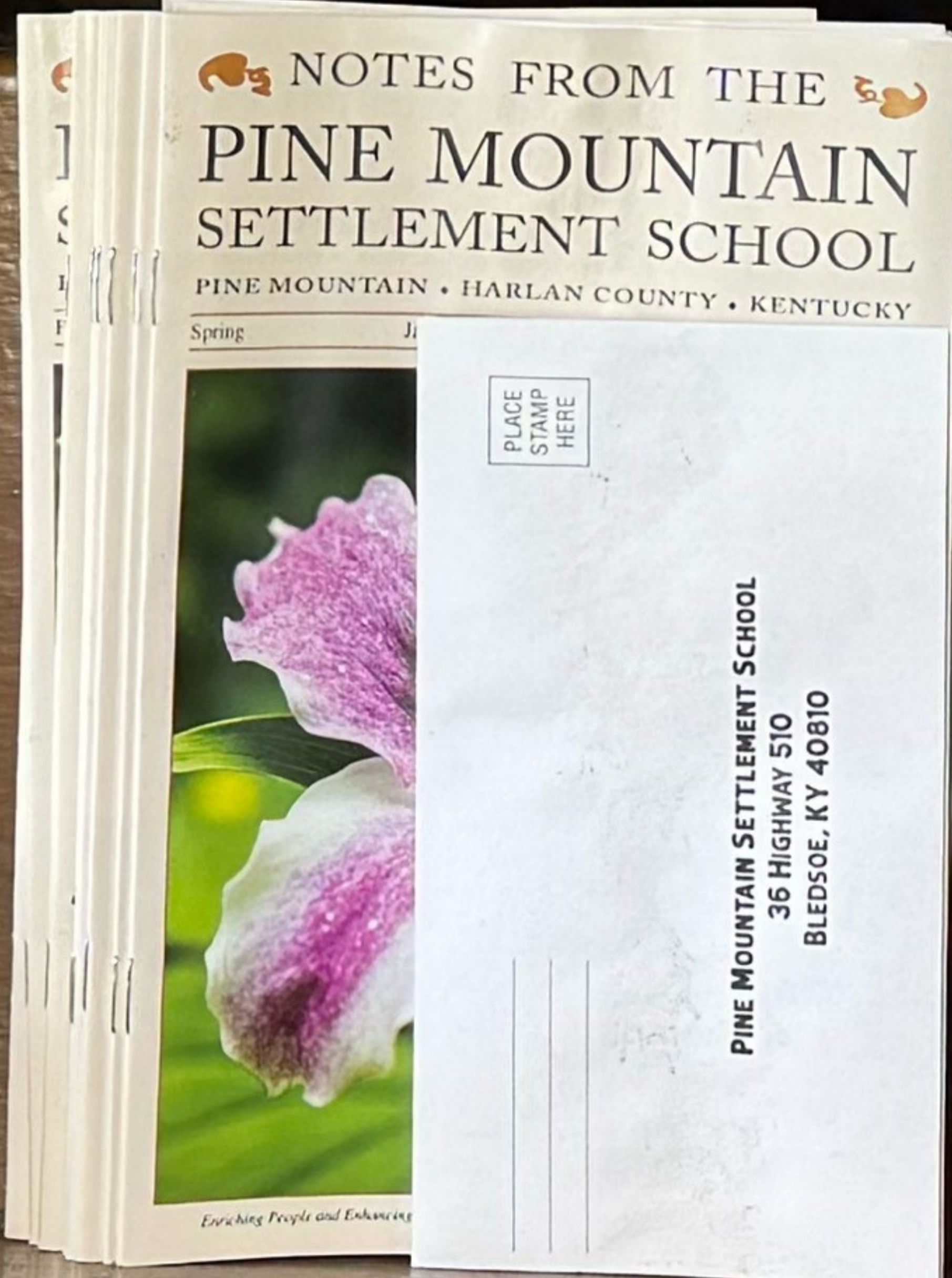
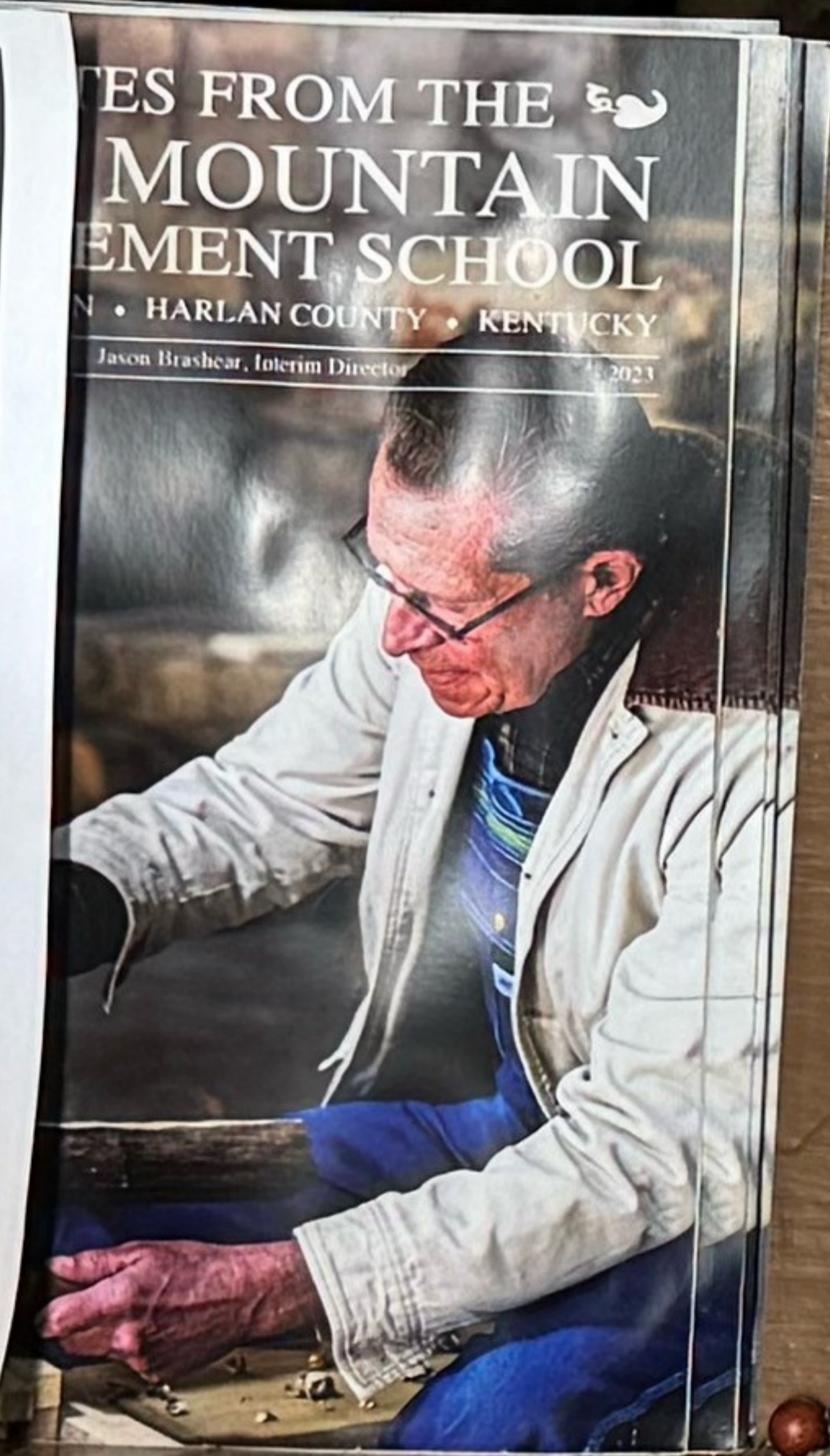
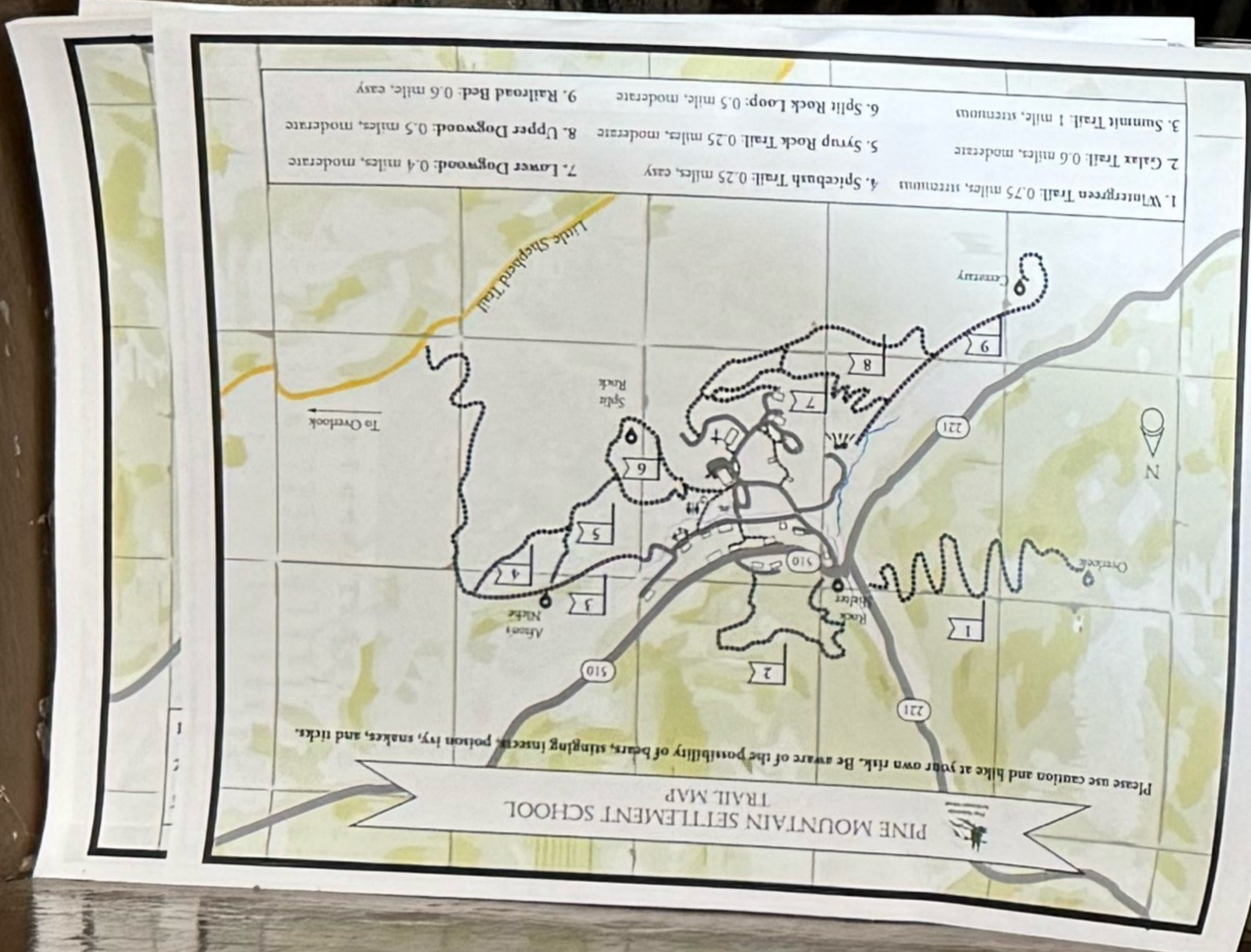
Hey everyone,

Attached is a copy of our wellhead protection plan for each of you, which outlines information on the water source for our water plant. There is also a hard copy printed and bound in the central room of the office (pictured below) for anyone to view including guests if they inquire.

If you have any questions please let me know.

-Curtis

Curtis Cox
Director of Operations, Pine Mountain Settlement School
www.pinemountainsettlementschool.com





PINE MOUNTAIN
SETTLEMENT SCHOOL

36 HIGHWAY 510
ELDERFORD, KY 40810
PHONE: 502-357-1111 | PINEMOUNT.ORG
WWW.PINEMOUNTSETTLEMENTSCHOOL

Kentucky Division of Water
Wellhead Protection Plan
5-Year Update

Pine Mountain Settlement School
PWS ID Number - KY0483135
Agency Interest Number - 33911

Director Of Operations
Curtis Cox

Plant Operator
TJ Falce

Plant Technician
Ezra Cornett

ENRICHING LIVES
— AND —
CONNECTING PEOPLE
— SINCE 1913 —