Source Water Protection Plan
Pine Grove Water

PWSID WV3305205

Wetzel County

June 2016

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In cooperation with Pine Grove Water

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I certify the information in the source water protection plan is complete and accurate to the best of my knowledge.

Signature of responsible party or designee authorized to sign for water utility:

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MAYOR

Title of Authorizing Signatory:

6/24/2016

Date of Submission:

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APPENDICES

SOURCE WATER PROGRAM ACRONYMS

AST	Aboveground Storage Tank
BMP	Best Management Practices
ERP	Emergency Response Plan
GWUDI	Ground Water Under the Direct Influence of Surface Water
LEPC	Local Emergency Planning Committee
OEHS/EED	Office of Environmental Health Services/Environmental Engineering Division
PE	Professional Engineer
PSSCs	Potential Source of Significant Contamination
PWSU	Public Water System Utility
RAIN	River Alert Information Network
RPDC	Regional Planning and Development Council
SDWA	Safe Drinking Water Act
SWAP	Source Water Assessment and Protection
SWAPP	Source Water Assessment and Protection Program
SWP	Source Water Protection
SWPA	Source Water Protection Area
SWPP	Source Water Protection Plan
WARN	Water/Wastewater Agency Response Network
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Program
WSDA	Watershed Delineation Area
WVBPH	West Virginia Bureau for Public Health
WVDEP	West Virginia Department of Environmental Protection
WVDHHR	West Virginia Department of Health and Human Resources
WVDHSEM	West Virginia Division of Homeland Security and Emergency Management
ZCC	Zone of Critical Concern
ZPC	Zone of Peripheral Concern

1.0 PURPOSE

The goal of the West Virginia Bureau of Public Health (WVBPH) source water assessment and protection (SWAP) program is to prevent degradation of source waters which may preclude present and future uses of drinking water supplies to provide safe water in sufficient quantity to users. The most efficient way to accomplish this goal is to encourage and oversee source water protection on a local level. Many aspects of source water protection may be best addressed by engaging local stakeholders.

The intent of this document is to describe what Pine Grove Water has done, is currently doing, and plans to do to protect its source of drinking water. Although this water system treats the water to meet federal and state drinking water standards, conventional treatment does not fully eradicate all potential contaminants, and treatment that goes beyond conventional methods is often very expensive. By completing this plan, Pine Grove Water acknowledges that implementing measures to minimize and mitigate contamination can be a relatively economical way to help ensure the safety of the drinking water.

1.1 WHAT ARE THE BENEFITS OF PREPARING A SOURCE WATER PROTECTION PLAN?

- Fulfilling the requirement for the public water utilities to complete or update their source water protection plan.
- Identifying and prioritizing potential threats to the source of drinking water; and establishing strategies to minimize the threats.
- Planning for emergency response to incidents that compromise the water supply by contamination or depletion, including how the public, state, and local agencies will be informed.
- Planning for future expansion and development, including establishing secondary sources of water.
- Ensuring conditions to provide the safest and highest quality drinking water to customers at the lowest possible cost.
- Providing more opportunities for funding to improve infrastructure, purchase land in the protection area, and other improvements to the intake or source water protection areas.

2.0 BACKGROUND: WV SOURCE WATER ASSESSMENT AND PROTECTION PROGRAM

Since 1974, the federal Safe Drinking Water Act (SDWA) has set minimum standards on the construction, operation, and quality of water provided by public water systems. In 1986, Congress amended the SDWA. A portion of those amendments were designed to protect the source water contribution areas around ground water supply wells. This program eventually became known as the Wellhead Protection Program (WHPP). The purpose of the WHPP is to prevent pollution of the source water supplying the wells.

The Safe Drinking Water Act Amendments of 1996 expanded the concept of wellhead protection to include surface water sources under the umbrella term of Source Water Protection. The amendments encourage states to establish SWAP programs to protect all public drinking water supplies. As part of this initiative states must explain how protection areas for each public water system will be delineated, how potential contaminant sources will be inventoried, and how susceptibility ratings will be established.

In 1999, the WVBPH published the West Virginia Source Water Assessment and Protection Program, which was endorsed by the United States Environmental Protection Agency. Over the next few years, WVBPH staff completed an assessment (i.e., delineation, inventory and susceptibility analysis) for all of West Virginia's public water systems. Each public water system was sent a copy of its assessment report. Information regarding assessment reports for Pine Grove Water can be found in **Table 1**.

3.0 STATE REGULATORY REQUIREMENTS

On June 6, 2014, §16 1 2 and §16 1 9a of the Code of West Virginia, 1931,was reenacted and amended by adding three new sections, designated §16 1 9c, §16 1 9d and §16-1-9e. The changes to the code outlines specific requirements for public water utilities that draw water from a surface water source or a surface water influenced groundwater source.

Under the amended and new codes each existing public water utility using surface water or ground water influenced by surface water as a source must have completed or updated a source water protection plan by July 1, 2016, and must continue to update their plan every three years. Existing source water protection plans have been developed for many public water utilities in the past. If available, these plans were reviewed and considered in the development of this updated plan. Any new water system established after July 1, 2016 must submit a source water protection plan before they start to operate. A new plan is also required when there is a significant change in the potential sources of significant contamination (PSSC) within the zone of critical concern (ZCC).

The code also requires that public water utilities include details regarding PSSCs, protection measures, system capacities, contingency plans, and communication plans. Before a plan can be approved, the local health department and public will be invited to contribute information for consideration. In some instances, public water utilities may be asked to conduct independent studies of the source water protection area and specific threats to gain additional information.

4.0 SYSTEM INFORMATION

Pine Grove Water is classified as a state regulated public utility and operates a community public water system. A community public water system is a system that regularly supplies drinking water from its own sources to at least 15 service connections used by year round residents of the area or regularly serves 25 or more people throughout the entire year. For purposes of this source water protection plan, community public water systems are also referred to as public water utilities. Information on the population served by this utility is presented in **Table 1** below.

Table 1. Population Served by Pine Grove Water*

Administrative office location:	992 North Fork Road Pine Grove, WV 26419		
Is the system a public utility, according to the Public Service Commission rule?	Yes		
Date of Most Recent Source Water Assessment Report:	March 2003		
Date of Most Recent Source Water Protection Plan:	September 2010		
Population served directly:	362 customers, or approximately 905 people.**		
Bulk Water Purchaser Systems:	**System Name**	**PWSID Number**	**Population**
	N/A	N/A	N/A
Total Population Served by the Utility:	The total population served by Pine Grove Water is 905 people.		
Does the utility have multiple source water protection areas (SWPAs)?	No		
How many SWPAs does the utility have?	1		

*This information is from the 2016 Source Water Protection Contingency Plan for Pine Grove Municipal Water Works by The Thrasher Group, Inc. This document is attached in **Appendix D**.

**This information was updated after the completion of the Contingency Plan in 2016. The estimated population served is determined by multiplying the number of the customers by 2.5 people per household.

5.0 WATER TREATMENT AND STORAGE

As required, Pine Grove Water has assessed their system (e.g., treatment capacity, storage capacity, unaccounted for water, contingency plans) to evaluate their ability to provide drinking water and protect public health. **Table 2** contains information on the water treatment methods and capacity of the utility. Information about the surface sources from which Pine Grove Water draws water can be found in **Table 3**. If the utility draws water from any groundwater sources to blend with the surface water the information about these ground water sources can be found in **Table 4**.

Table 2. Pine Grove Water Treatment Information*

Water Treatment Processes (List All Processes in Order)	Raw water intake - Intake Pumps - Raw Water Tank – Flocculation – Filtration - Chlorination/Clearwell - High Service Pumps - Distribution System
Current Treatment Capacity (gal/day)	The treatment capacity of the plant is 192,000 gallons per day.
Current Average Production (gal/day)	On average, the treatment plant produces approximately 71,475 gallons per day.
Maximum Quantity Treated and Produced (gal)	The maximum quantity treated and produced in the last year was 144,000 gallons.
Minimum Quantity Treated and Produced (gal)	The minimum quantity treated and produced in the last year was 23,000 gallons.
Average Hours of Operation	The treatment plant is staffed and operated 8 hours/day.
Maximum Hours of Operation in One Day	The maximum hours of operation in a single day in the last year was 16 hours.
Minimum Hours of Operation in One Day	The minimum hours of operation in a single day in the last year was 3 hours.
Number of Storage Tanks Maintained	The water system maintains 2 treated water storage tanks.
Total Gallons of Treated Water Storage (gal)	The system has approximately 250,000 gallons of treated water storage.
Total Gallons of Raw Water Storage (gal)	177,000 gallons – 70% available for use due to capacities of raw water intake pumps.

*This information is from the 2016 Source Water Protection Contingency Plan for Pine Grove Municipal Water Works by The Thrasher Group, Inc. This document is attached in **Appendix D**.

Table 3. Pine Grove Water Surface Water Sources*

Intake Name	SDWIS #	Local Name	Describe Intake	Name of Water Source	Date Constructed / Modified	Frequency of Use (Primary/ Backup/ Emergency)	Activity Status (Active/ Inactive)
Pine Grove Intake	-	Intake	12” T-Shaped intake, gravity flows to wet-well, pumped to raw water tank/treatment plant.	North Fork Fishing Creek	Intake was last modified in 2002.	Primary	Active

*This information is from the 2016 Source Water Protection Contingency Plan for Pine Grove Municipal Water Works by The Thrasher Group, Inc. This document is attached in **Appendix D**.

Table 4. Pine Grove Water Groundwater Sources

Does the utility blend with groundwater?					No				
Well/Spring Name	SDWIS #	Local Name	Date Constructed/ Modified	Completion Report Available (Yes/No)	Well Depth (ft.)	Casing Depth (ft.)	Grout (Yes/No)	Frequency of Use (Primary/ Backup/ Emergency)	Activity Status (Active/ Inactive)
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

6.0 DELINEATIONS

For surface water systems, delineation is the process used to identify and map the drainage basin that supplies water to a surface water intake. This area is generally referred to as the source water protection area (SWPA). All surface waters are susceptible to contamination because they are exposed at the surface and lack a protective barrier from contamination. Accidental spills, releases, sudden precipitation events that result in overland runoff, or storm sewer discharges can allow pollutants to readily enter the source water and potentially contaminate the drinking water at the intake. The SWPA for surface water is distinguished as a Watershed Delineation Area (WSDA) for planning purposes; and the Zone of Peripheral Concern (ZPC) and Zone of Critical Concern (ZCC) are defined for regulatory purposes.

The WSDA includes the entire watershed area upstream of the intake to the boundary of the State of West Virginia border or a topographic boundary. The ZCC for a public surface water supply is a corridor along streams within the watershed that warrants more detailed scrutiny due to its proximity to the surface water intake and the intake's susceptibility to potential contaminants within that corridor. The ZCC is determined using a mathematical model that accounts for stream flows, gradient and area topography. The length of the ZCC is based on a five-hour time-of-travel of water in the streams to the water intake, plus an additional one-quarter mile below the water intake. Ohio River ZCC delineations are based on ORSANCO guidance and extend 25 miles above the intake. The width of the zone of critical concern is 1,000 feet measured horizontally from each bank of the principal stream and five hundred feet measured horizontally from each bank of the tributaries draining into the principal stream. Ohio River ZCC delineations are based on ORSANCO guidance and extend 25 miles above the intake and one-quarter mile below the intake. The Ohio River ZCC delineations include 1,320 feet (one-quarter mile) measured from the bank of the main stem of the Ohio River and 500 feet on tributary.

The ZPC for a public surface water supply source and for a public surface water influenced groundwater supply source is a corridor along streams within a watershed that warrants scrutiny due to its proximity to the surface water intake and the intake's susceptibility to potential contaminants within that corridor. The ZPC is determined using a mathematical model that accounts for stream flows, gradient and area topography. The length of the zone of peripheral concern is based on an additional five-hour time-of-travel of water in the streams beyond the perimeter of the zone of critical concern, which creates a protection zone of ten hours above the water intake. The width of the zone of peripheral concern is one thousand feet measured horizontally from each bank of the principal stream and five hundred feet measured horizontally from each bank of the tributaries draining into the principal stream.

For groundwater supplies there are two types of SWPA delineations: 1) wellhead delineations and 2) conjunctive delineations, which are developed for supplies identified as groundwater under the direct influence of surface water, or GWUDIs. A wellhead protection area is determined to be the area contributing to the recharge of the groundwater source (well or spring), within a five year time of travel. A conjunctive delineation combines a wellhead protection area for the hydrogeologic recharge and a connected surface area contributing to the wellhead.

Information and maps of the WSDA, ZCC, ZPC and Wellhead Protection Area for this public water supply were provided to the utility and are attached to this report. See **Appendix A. Figures**. Other information about the WSDA is shown in **Table 5**.

Table 5. Watershed Delineation Information

Size of WSDA (Indicate units)	The watershed delineation area covers 42.4 square miles.
River Watershed Name (8-digit HUC)	Middle Ohio North Watershed – HUC 5030201
Size of Zone of Critical Concern (Acres)	The ZCC covers approximately 6,044 acres.
Size of Zone of Peripheral Concern (Acres) (Include ZCC area)	The ZPC covers approximately 12,996 acres.
Method of Delineation for Groundwater Sources	N/A
Area of Wellhead Protection Area (Acres)	N/A

7.0 PROTECTION TEAM

One important step in preparing a source water protection plan is to organize a source water protection team who will help develop and implement the plan. The legislative rule requires that water utilities make every effort to inform and engage the public, local government, local emergency planners, the local health department and affected residents at all levels of the development of the protection plan. WVBPH recommends that the water utility invite representatives from these organizations to join the protection team, which will ensure that they are given an opportunity to contribute in all aspects of source water protection plan development. Public water utilities should document their efforts to engage representatives and provide an explanation if any local stakeholder is unable to participate. In addition, other local stakeholders may be invited to participate on the team or contribute information to be considered. These individuals may be emergency response personnel, local decision makers, business and industry representatives, land owners (of land in the protection area), and additional concerned citizens.

The administrative contact for Pine Grove Water is responsible for assembling the protection team and ensuring that members are provided the opportunity to contribute to the development of the plan. The acting members of the Protection Team are listed in **Table 6.**

The role of the protection team members will be to contribute information to the development of the source water protection plan, review draft plans and make recommendations to ensure accuracy and completeness, and when possible contribute to implementation and maintenance of the protection plan. The protection team members are chosen as trusted representatives of the community served by the water utility and may be designated to access confidential data that contains details about the local PSSCs. The input of the protection team will be carefully considered by the water utility when making final decisions relative to the documentation and implementation of the source water protection plan.

Pine Grove Water will be responsible for updating the source water protection plan and rely upon input from the protection team and the public to better inform their decisions. To find out how you can become involved as a participant or contributor, visit the utility website or call the utility phone number, which are provided in **Table 6.**

Table 6. Protection Team Member and Contact Information

Name	Representing	Title	Phone Number	Email
Tim Flint	Pine Grove Water Department	Chief Operator	304-780-6512	timflint2003@yahoo.com
Edgar Sapp	Wetzel County Office of Emergency Management	Director	304-455-6960	wc911@frontier.com
Tim Wilcox	Pine Grove Volunteer Fire Department	Fire Chief	304-889-3353	-
Charles Roberts	-	Citizen	[redacted]	ccroberts@citilink.net
John Hurst	City Council	Councilman	[redacted]	-
Barbara King	City Council	Councilwoman	[redacted]	-
Rhonda Spencer	Town of Pine Grove	Recorder	304-889-3351	-
Date of first protection Team Meeting		May 26, 2016		
Efforts made to inform and engage local stakeholders (public, local government, local emergency planners, local health department, and affected residents) and explain absence of recommended stakeholders:		The protection team for Pine Grove first met on 5/26/2016 at the Pine Grove fire house. Tim Flint arranged the meeting, then was unable to attend at the last minute. The remaining members met and discussed the draft plan, and scheduled the public meeting for the next town council meeting. Rhonda Spencer was also unable to attend, but will participate with the team in the future. In addition, the final version of the plan will be provided to the county health department representative when it is completed. A scanned copy of the sign-in sheet and confidentiality agreement is attached in **Appendix E. Supporting Documentation**. Pine Grove Water held a public meeting on 6/14/2016 at the Robert C. Byrd Center in Pine Grove. The public meeting took place during the regularly scheduled town council meeting. More information about this meeting is provided in **Table 10. Education and Outreach Implementation Plan**.		

8.0 POTENTIAL SOURCES OF SIGNIFICANT CONTAMINATION

Source water protection plans should provide a complete and comprehensive list of the PSSCs contained within the ZCC based upon information obtained from the WVBPH, working in cooperation with the West Virginia Department of Environmental Protection (WVDEP) and the West Virginia Division of Homeland Security and Emergency Management (WVDHSEM). A facility or activity is listed as a PSSC if it has the potential to release a contaminant that could potentially impact a nearby public water supply, and it does not necessarily indicate that any release has occurred.

The list of PSSCs located in the SWPA is organized into two types: 1) SWAP PSSCs, and 2) Regulated Data. SWAP PSSCs are those that have been collected and verified by the WVBPH SWAP program during previous field investigations to form the source water assessment reports and source water protection plans. Regulated PSSCs are derived from federal and state regulated databases, and may include data from WVDEP, US Environmental Protection Agency, WVDHSEM, and out-of-state data sources.

8.1 CONFIDENTIALITY OF PSSCS

A list of the PSSCs contained within the ZCC should be included in the source water protection plan. However, the exact location, characteristics and approximate quantities of contaminants shall only be made known to one or more designees of the public water utility and maintained in a confidential manner. In the event of a chemical spill, release or other related emergency, information pertaining to the contaminant shall be immediately disseminated to any emergency responders reporting to the site. The designees for Pine Grove Water are identified in the communication planning section of the source water protection plan.

PSSC data from some agencies (ex. WVDHSEM, WVDEP, etc.) may be restricted due to the sensitive nature of the data. Locational data will be provided to the public water utility. However, to obtain specific details regarding contaminants, (such as information included in Tier II reports), water utilities should contact the local emergency planning commission (LEPC) or agencies, directly. While the maps and lists of the PSSCs and regulated sites are to be maintained in a confidential manner, these data are provided in **Appendix A. Figures** for internal review and planning uses only.

8.2 LOCAL AND REGIONAL PSSCS

For the purposes of this source water protection plan, local PSSCs are those that are identified by the water utility and local stakeholders and are not already identified in the PSSCs lists distributed by the WVBPH and other agencies. Local stakeholders may identify local PSSCs for two main reasons. The first is that it is possible that threats exist from unregulated sources and land uses that have not already been inventoried and do not appear in regulated databases. For this reason each public water utility should investigate their protection area for local PSSCs. A PSSC inventory should identify all contaminant sources and land uses in the delineated ZCC. The second reason local PSSCs are identified is because public water utilities may consider expanding the PSSC inventory effort outside of the ZCC into the ZPC and WSDA if necessary to properly identify all threats that could impact the drinking water source. As the utility considers threats in the watershed they may consider collaborating with upstream communities to identify and manage regional PSSCs.

When conducting local and regional PSSC inventories, utilities should consider that some sources may be obvious like above ground storage tanks, landfills, livestock confinement areas, highway or railroad right of ways, and sewage treatment facilities. Others are harder to locate like abandoned cesspools, underground tanks, French drains, dry wells, or old dumps and mines.

Pine Grove Water reviewed intake locations and the delineated SWPAs to verify the existence of PSSCs provided by the WVBPH and identify new PSSCs. If possible, locations of regulated sites within the SWPA were confirmed. Information on any new or updated PSSCs identified by Pine Grove Water and not already appearing in datasets from the WVBPH can be found in Table 7.

Table 7. Locally Identified Potential Sources of Significant Contamination

PSSC Number	Map Code	Site Name	Site Description	Relative Risk Score	Comments
-	-	-	-	-	-

8.3 PRIORITIZATION OF THREATS AND MANAGEMENT STRATEGIES

Once the utility has identified local concerns, they must develop a management plan that identifies specific activities that will be pursued by the public water utility in cooperation and concert with the WVBPH, local health departments, local emergency responders, LEPC and other agencies and organizations to protect the source water from contamination threats.

Depending on the number identified, it may not be feasible to develop management strategies for all of the PSSCs in the SWPA. The identified PSSCs can be prioritized by potential threat to water quality, proximity to the intake(s), and local concern. The highest priority PSSCs can be addressed first in the initial management plan. Lower ranked PSSCs can be addressed in the future as time and resources allow. To assess the threat to the source water, water systems should consider confidential information about each PSSC. This information may be obtained from state or local emergency planning agencies, Tier II reports, facility owner, facility groundwater protection plans, spill prevention response plans, results of field investigations, etc.

In addition to identifying and prioritizing PSSCs within the SWPA, local source water concerns may also focus on critical areas. For the purposes of this source water protection plan, a critical area is defined as an area that is identified by local stakeholders and can lie within or outside of the ZCC. Critical areas may contain one or more PSSCs which would require immediate response to address a potential incident that could impact the source water.

A list of priority PSSCs was selected and ranked by the Pine Grove Water Protection Team. This list reflects the concerns of this specific utility and may contain PSSCs not previously identified and not within the ZCC or ZPC. **Table 8** contains a description of why each critical area or PSSC is considered a threat and what management strategies the utility is either currently using or could use in the future to address each threat.

9.0 IMPLEMENTATION PLAN FOR MANAGEMENT STRATEGIES

Pine Grove Water reviewed the recommended strategies listed in their previous source water protection plan, to consider if any of them should be adopted and incorporated in this updated plan. **Table 9** provides a brief statement summarizing the status of the recommended strategies. **Table 9** also lists strategies from a previous plan that are being incorporated in this plan update

When considering source management strategies and education and outreach strategies, this utility has considered how and when the strategies will be implemented. The initial step in implementation is to establish responsible parties and timelines to implement the strategies. The water utility, working in conjunction with the Protection Team members, can determine the best process for completing activities within the projected time periods. Additional meetings may be needed during the initial effort to complete activities, after which the Protection Team should consider meeting annually to review and update the Source Water Protection Plan. A system of regular updates should be included in every implementation plan.

Proposed commitments and schedules may change but should be well documented and reported to the local stakeholders. If possible, utilities should include cost estimates for strategies to better plan for implementation and possible funding opportunities. Pine Grove Water has developed an implementation plan for priority concerns listed in **Table 8**. The responsible team member, timeline, and potential cost of each strategy are presented in **Table 9**. Note: Because timelines may change, future plan updates should describe the status of each strategy and explain the lack of progress. The responsible team member, timeline, and potential cost of each strategy was estimated and is presented in **Table 9**.

Table 8. Priority PSSCs or Critical Areas

PSSC or Critical Area	Priority Number	Reason for Concern
Oil and Gas Wells	1	Drilling of gas wells within the SWPA and areas upstream is increasing, including drilling of Marcellus Shale wells. Drilling of some Marcellus Shale wells can produce large volumes of brine water, and can produce water with chemical additives used for fracturing and constituents such as benzene and certain radioactive elements. Uncontrolled spills and releases could introduce contaminants into source water. Some constituents in brine, including bromides, have the potential to increase total trihalomethane formation.
Vandalism	2	Vandals have broken previously into the city garage located next to WTP building.
Roadways, Including County Route 15 and County Route 17	3	Sections of roadway pass through or near the SWPA, and potential spills are a concern.
Emergency Power Generation	4	The water system has experienced problems with power outages before, and utility staff believe that securing a generator for the water treatment plant should be a priority.
Large Water Withdrawals	5	The water system has concerns about large water withdrawals upstream of the intake. North Fork Fishing Creek is not a large stream, and if the large water withdrawals occurred during drought there are concerns that there would not be sufficient flow to supply the water treatment plant.

Table 9. Priority PSSC Management Strategies

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status/ Schedule	Comments	Estimated Cost
Previous Plan Status	There were 7 management strategies recommended in the existing plan. 3 of these strategies addressed priorities that have either already been implemented or are no longer a concern. 4 of these are ongoing or continue to be a concern. These are incorporated in this plan update and listed below.	-	-	-	-
Oil and Gas Wells	System staff will review public information on surface water protection practices for oil and gas industry to raise PWS staff awareness of surface water protection practices of oil and gas industry. Evaluate increased sampling of water quality for parameters (e.g., chlorides, bromides, TDS [conductivity]) associated with oil and gas industry to better assess whether source water quality is being impacted by oil and gas industry, and help develop baseline data of water quality. Evaluate installing monitoring equipment upstream of (or at) intake to provide early warning of possible brine or other spills into source water and help develop water quality data of source water.	PWS Chief Operator / Town Council Member	Complete by 2019 SWPP Update	Maintain contact with neighboring public water systems to receive input on effects of anticipated Marcellus Shale and gas well drilling, and track status of regulations through such organizations as WVDHHR, West Virginia Public Service If parameters associated with oil and gas industry become problematic to water quality, consider symposium for local oil and gas industry to raise awareness of source water protection and review regulatory requirements. Evaluate establishing a joint effort with officials from surrounding jurisdictions who may have concern about drilling of oil and gas wells to learn about additional practices being developed by others and how to implement applicable practices within SWPA.	Enhanced testing costs can range from $1,000 and up depending on program. WVDHHR grant funds may be available.

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status/ Schedule	Comments	Estimated Cost
Vandalism	Evaluate improving security, including adding security cameras at intake and at WTP. Evaluate improving security by adding fencing around WTP and intake. Install signage at WTP and intake, at visible places to general public, warning that tampering with this installation is a federal offense, and potentially providing a notice regarding video surveillance. Include emergency contact numbers.	PWS Chief Operator	By 2019 SWPP Update	-	Cost for cameras will vary but is expected to range from $5,000 to $15,000. WVDHHR grant funds may be available. Cost for security fencing could be $30 to $45/ft. WVDHHR grant funds may be available. Installing signage could cost between $1,000 and $2,000. WVDHHR grant funds may be available.
Roadways, Including County Route 15 and County Route 17	Pine Grove Water will Continue to coordinate with local first responders and work to raise awareness for the need to protect drinking water supplies. System staff will evaluate installing signage along State Route 2 and targeted city streets with emergency contact numbers. This would also help raise awareness with motorists and truckers that they are traveling through a source water protection zone while providing them with a call number in an emergency. Note: See additional language regarding West Virginia Division of Highways. System staff will also maintain contact with fire departments regarding status of their booms for in-stream spill containment.	PWS Chief Operator / Town Council Member	Ongoing efforts	Wetzel County Office of Emergency Services has conducted a commodity flow study in the past. This study will be updated in the next year, and this information will be provided to the water operators.	Minimal cost associated with staff time to coordinate with emergency responders.

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status/ Schedule	Comments	Estimated Cost
Emergency Power Generation	Water utility staff will evaluate the possibility of installing a standby generator at the treatment plan that could power the plant and raw water intakes during power outages. In the past, they have been able to rent or borrow a generator but would prefer to have one on site.	Chief Operator	By 2019 Plan Update	-	Minimal cost associated with evaluating the cost of a generator, generator costs could vary.
Large Water Withdrawals	The water system and county emergency services will work with those companies that are responsible for the most hydraulic fracturing operations in the watershed. The companies and emergency services meet bimonthly. The emergency services director will continue to represent the water system at these meetings and ensure that all upstream operations are aware that they are upstream of a public water system and that their operations are conducted responsibly.	Utility staff/ Wetzel County Office of Emergency Management	Ongoing Efforts	The water system will attempt to establish “Source Water Protection Partners” with those companies who are willing and interested. A list of these companies and a description of the partnership could be attached in future SWPP updates. These companies were also invited to attend the public meeting for the SWPP.	Minimal cost associated with staff time to contact and work with oil/gas companies.
Source Water Protection Plan	Update this Source Water Protection Plan at least every 3 years as required by the State Code of West Virginia.	Source Water Protection Team	Every 3 years. Next update in 2019	The Protection Plan should also be updated any time there is a significant change within the protection area or in utility staff. Yearly meetings of the protection team are recommended to ensure all members are up to date and informed about any developments within the protection area.	Minimal costs associated with team members’ time
Future Development and Other Activities Within the Watershed	Water utility staff will perform a yearly “windshield survey” of the zone of critical concern. They will note changes in land use, water quality, and other developments that may have occurred since the previous year’s survey. These changes will be	Water utility staff	Yearly, next survey in 2017	Document the date of the survey and any changes that may have occurred within the ZCC that could impact water quality.	Minimal cost associated with staff time

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status/ Schedule	Comments	Estimated Cost
	documented and reflected in future source water protection plan updates.				
Yearly Source Water Protection Team Meetings	The Protection Team for Pine Grove Water Department will meet on a yearly basis to discuss any changes that might have occurred within the watershed or to find replacements for members who can no longer participate on the team.	Source Water Protection Team	Yearly, next meeting in 2017	-	Minimal cost associated with staff time
Regular Coordination with Emergency Managers	Local emergency planners have access to confidential chemical contaminant information in Tier II reports from facilities in the SWPA. The utility should coordinate with the local emergency planners to gain an understanding of potential contaminants to better prepare for a spill event. Utility staff will continue to communicate with these emergency services groups on a regular basis, especially when there is not an ongoing emergency. They will invite the local emergency planners to meet yearly as part of the Source Water Protection Team.	Water utility staff and emergency response personnel.	Engage local emergency planners immediately and communicate on a regular basis.	-	Minimal cost associated with staff time

10.0 EDUCATION AND OUTREACH STRATEGIES

The goal of education and outreach is to raise awareness of the need to protect drinking water supplies and build support for implementation strategies. Education and outreach activities will also ensure that affected citizens and other local stakeholders are kept informed and provided an opportunity to contribute to the development of the source water protection plan. Pine Grove Water has created an Education and Outreach plan that describes activities it has either already implemented or could implement in the future to keep the local community involved in protecting their source of drinking water. This information can be found in **Table 10**.

Table 10. Education and Outreach Implementation Plan

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status/ Schedule	Comments	Estimated Cost
Public Meeting	Pine Grove Water held an informational meeting with local residents about source water protection efforts during the regularly scheduled city council meeting. The meeting was structured to provide information to the public about the SWPP and how they can get involved in source water protection. A Tetra Tech representative gave a presentation on the plan, then accepted questions and comments from those in attendance. The meeting was advertised for several weeks by posting an informational flyer in City Hall and on various bulletin boards around town.	Utility Staff, protection team	The meeting was held on 6/14/2016	The meeting was held at the Robert C. Byrd Building in Pine Grove. There were 6 attendees in all, representing the city council and water system, but no public representatives were present. The sign-in sheet from the meeting is attached in **Appendix E. Supporting Documentation**.	Minimal cost related to protection team time to arrange and hold meeting.
Consumer Confidence Report	The water system publishes a Consumer Confidence Report (CCR) annually, as required by the Safe Drinking Water Act, which is sent to all water customers. Information concerning the Source Water Assessment is included in the CCR. In the future, the system will include a reference to this source water protection plan and how customers can access a copy.	Utility Staff	Yearly	This would be in addition to required Source Water Assessment information, including source of water and susceptibility to contamination.	CCR required by SDWA, included in annual budget.
Brochures, pamphlets, and letters	Send a letter and/or brochure providing educational information to residences and businesses. These will alert the recipients of the need for source water protection and conservation. Businesses that use greater-than-household quantities of regulated substances may receive a different letter.	Utility Staff	Within a year	The Source Water Collaborative has released an educational brochure building tool to assist with creating custom brochures targeting local decision makers. This tool is available at: http://www.yourwateryourdecision.org and may assist in community planning and development. There is also an example brochure attached in **Appendix E. Supporting Documentation**.	Cost in brochure printing and mailing

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status/ Schedule	Comments	Estimated Cost
School Curricula	Work with the school system to incorporate source water activities into the school curricula. Visit school or invite students for a plant tour to tie in with school curricula. Ask the school to include message in school newsletter to raise awareness about source water protection and conservation.	Utility Staff	Yearly, as requested by local schools.	Operator will initiate effort, locate the appropriate individuals in school and/or on local school board. Can provide websites with free education materials to promote source water protection and conservation. Also operator may visit school or invite students for a plant tour to tie in with classroom materials.	Minimal costs. Would require time to coordinate, visit classroom and provide tour.
Drinking Water Protection Signs	Erecting Drinking Water Protection Signs along highways is a common awareness strategy in some states and recommended by the USEPA. Signs are placed to alert the public to the SWPA and about what to do in case of accidental spills.	Utility and City Staff	As needed	-	Cost associated with participation in activities.
Media Campaign	Work with the local television stations to post source water and drinking water fact bulletins on public access television.	Utility Staff	Yearly	Information can be run at different times of the year (ex. focus on fertilizer contamination in spring/summer).	The ad for public access television should be free, so the cost would just be the time to prepare the information

11.0 CONTINGENCY PLAN

The goal of contingency planning is to identify and document how the utility will prepare for and respond to any drinking water shortages or emergencies that may occur due to short and long term water interruption, or incidents of spill or contamination. During contingency planning, utilities should examine their capacity to protect their intake, treatment, and distribution system from contamination. They should also review their ability to use alternative sources and minimize water loss, as well as their ability to operate during power outages. In addition, utilities should report the feasibility of establishing an early warning monitoring system and meeting future water demands.

Isolating or diverting any possible contaminant from the intake for a public water system is an important strategy in the event of an emergency. One commonly used method of diverting contaminants from an intake is establishing booms around the intake. This can be effective, but only for contaminants that float on the surface of the water. Alternatively, utilities can choose to pump floating contaminants from the water or chemically neutralize the contaminant before it enters the treatment facility.

Public utilities using surface sources should be able to close the intake by one means or another. However, depending upon the system, methods for doing so could vary greatly and include closing valves, lowering hatches or gates, raising the intake piping out of the water, or shutting down pumps. Systems should have plans in place in advance as to the best method to protect the intake and treatment facility. Utilities may benefit from turning off pumps and, if possible, closing the intake opening to prevent contaminants from entering the piping leading to the pumps. Utilities should also have a plan in place to sample raw water to identify the movement of a contaminant plume and allow for maximum pumping time before shutting down an intake (See Early Warning Monitoring System). The amount of time that an intake can remain closed depends on the water infrastructure and should be determined by the utility before an emergency occurs. The longer an intake can remain closed in such a case, the better.

Raw and treated water storage capacity also becomes extremely important in the event of such an emergency. Storage capacity can directly determine how effectively a water system can respond to a contamination event and how long an intake can remain closed. Information regarding the water shortage response capability of Pine Grove Water is provided in **Table 11**.

11.1 RESPONSE NETWORKS AND COMMUNICATION

Statewide initiatives for emergency response, including source water related incidents, are being developed. These include the West Virginia Water/Wastewater Agency Response Network (WV WARN, see http://www.wvwarn.org/) and the Rural Water Association Emergency Response Team (see http://www.wvrwa.org/). Pine Grove Water has analyzed its ability to effectively respond to emergencies and this information is also provided in **Table 11**.

Table 11. Pine Grove Water Shortage Response Capability*

Can the utility isolate or divert contamination from the intake or groundwater supply?	No
Describe the utility's capability to isolate or divert potential contaminants:	The water system is in the process of establishing a "Spill Trailer" that will hold booms, pads, and absorbents, along with other tools that would be useful during a spill.**
Can the utility switch to an alternative water source or intake that can supply full capacity at any time?	No; however, there is an existing interconnection with WCPSD1 that is available intermittently but cannot supply Pine Grove at full capacity due to the size of the distribution line.

Describe in detail the utility's capability to switch to an alternative source:	N/A; however, opening the valve at the interconnection will allow WCPSD1 to intermittently supply Pine Grove's average water demand.
Can the utility close the water intake to prevent contamination from entering the water supply?	Yes.
How long can the intake stay closed?	Approximately 4 days.
Describe the process to close the intake:	Shut down intake pumps; close valve on intake line.
Describe the treated water storage capacity of the water system:	Two (2) water storage tanks totaling 250,000 gallons. At the time of this report, Pine Grove was operating at 75% treated water storage capacity.
Is the utility a member of WVRWA Emergency Response Team?	No
Is the utility a member of WV-WARN?	No
List any other mutual aid agreements to provide or receive assistance in the event of an emergency:	N/A

*This information is from the 2016 Source Water Protection Contingency Plan for Pine Grove Municipal Water Works by The Thrasher Group, Inc. This document is attached in **Appendix D**.

**This information was updated after the completion of the Contingency Plan for Pine Grove.

11.2 OPERATION DURING LOSS OF POWER

Pine Grove Water analyzed its ability to operate effectively during a loss of power. This involved ensuring a means to supply water through treatment, storage, and distribution without creating a public health emergency. Information regarding the utility's capacity for operation during power outages is summarized in **Table 12**.

Table 12. Generator Capacity*

What is the type and capacity of the generator needed to operate during a loss of power?	The emergency generator capacity for the treatment facility is 48 kW and the standby capacity is estimated to be 60 kW. There is no need for a generator within the distribution system.
Can the utility connect to generator at intake/wellhead? If yes, select a scenario that best describes system.	N/A; the intake is located at the water treatment plant.
Can the utility connect to generator at treatment facility? If yes, select a scenario that best describes system.	Yes; a generator can be wired into the electrical controls of the treatment plant.

Can the utility connect to a generator in distribution system? If yes, select a scenario that best describes system.		N/A. There are no booster pump stations within the distribution system.	
Does the utility have adequate fuel on hand for the generator?		N/A. Pine Grove does not currently own a generator.	
What is your on-hand fuel storage and how long will it last operating at full capacity?		**Gallons**	**Hours**
		N/A	N/A
Provide a list of suppliers that could provide generators and fuel in the event of an emergency:	**Supplier**		**Phone Number**
	Generator	Bridgeport Equipment in New Martinsville, WV**	304-455-6686**
	Generator	GE Generator Systems	1-877-898-5510
	Fuel	Tom's One Stop	304-386-4813
	Fuel	Mason's Filling Station	304-386-4721
Does the utility test the generator periodically?		N/A	
Does the utility routinely maintain the generator?		N/A	
If no scenario describing the ability to connect to generator matches the utility's system or if utility does not have ability to connect to a generator, describe plans to respond to power outages:		Coordinate with local Emergency Services to obtain a generator.	

*This information is from the 2016 Source Water Protection Contingency Plan for Pine Grove Municipal Water Works by The Thrasher Group, Inc. This document is attached in **Appendix D.**

**This information was updated after the completion of the Contingency Plan for Pine Grove.

11.3 FUTURE WATER SUPPLY NEEDS

When planning for potential emergencies and developing contingency plans, a utility needs to not only consider their current demands for treated water but also account for likely future needs. This could mean expanding current intake sources or developing new ones in the near future. This can be an expensive and time consuming process, and any water utility should take this into account when determining emergency preparedness. Pine Grove Water has analyzed its ability to meet future water demands at current capacity, and this information is included in **Table 13**.

Table 13. Future Water Supply Needs for Pine Grove Water*

Is the utility able to meet water demands with the current production capacity over the next 5 years? If so, explain how you plan to do so.	Yes; there is little to no increase expected in the customer demand within the next five (5) years for Pine Grove. If any increase is experienced, it is expected to be minimal and the plant is expected to remain under the maximum treatment capacity. If a significant increase is experienced, the treatment plant would need to be upgraded at that time.
If not, describe the circumstances and plans to increase production capacity:	N/A

*This information is from the 2016 Source Water Protection Contingency Plan for Pine Grove Municipal Water Works by The Thrasher Group, Inc. This document is attached in **Appendix D.**

11.4 WATER LOSS CALCULATION

In any public water system there is a certain percentage of the total treated water that does not reach the customer. Some of this water is used in treatment plant processes such as back washing filters or flushing piping, but there is usually at least a small percentage that goes unaccounted for. To measure and report on this unaccounted for water, a public utility must use the method described in the Public Service Commission's rule, *Rules for the Government of Water Utilities*, 150CSR7, section 5.6. The rule defines unaccounted for water as the volume of water introduced into the distribution system less all metered usage and all known non-metered usage which can be estimated with reasonable accuracy.

To further clarify, metered usages are most often those that are distributed to customers. Non-metered usages that are being estimated include usage by fire departments for fires or training, un-metered bulk sells, flushing to maintain the distribution system, and water used for backwashing filters and cleaning settling basins. By totaling the known metered and non-metered uses the utility calculates unaccounted for water. Note: To complete annual reports submitted to the PSC, utilities typically account for known water main breaks by estimating the amount of water lost. However, for the purposes of the source water protection plan, any water lost due to leaks, even if the system is aware of how much water is lost at a main break, is not considered a use. Water lost through leaks and main breaks cannot be controlled during a water shortages or other emergencies and should be included in the calculation of percentage of water loss for purposes of the source water protection plan. The data in **Table 14** is taken from the most recently submitted Pine Grove Water PSC Annual Report.

Table 14. Water Loss Information*

Total Water Pumped (gal)		24,831,000
Total Water Purchased (gal)		0
Total Water Pumped and Purchased (gal)		24,831,000
Water Loss Accounted for Except Main Leaks (gal)	**Mains, Plants, Filters, Flushing, etc.**	0
	Fire Department	0
	Back Washing	0
	Blowing Settling Basins	0

Total Water Loss Accounted For Except Main Leaks	0
Water Sold- Total Gallons (gal)	15,908,000
Unaccounted For Lost Water (gal)	0
Water lost from main leaks (gal)	8,923,000
Total gallons of Unaccounted for Lost Water and Water Lost from Main Leaks (gal)	8,923,000
Total Percent Unaccounted For Water and Water Lost from Main Leaks (gal)	36%
If total percentage of Unaccounted for Water is greater than 15%, please describe any measures that could be taken to correct this problem:	Continue to conduct leak detection and make necessary repairs.

*This information was taken from the 2015 Public Service Commission Annual Report for Pine Grove Water. The 2016 Contingency Plan was completed using the 2014 Annual Report because the updated report had not yet been released.

11.5 EARLY WARNING MONITORING SYSTEM

Public water utilities are required to provide an examination of the technical and economic feasibility of implementing an early warning monitoring system. Implementing an early warning monitoring system may be approached in different ways depending upon the water utility's resources and threats to the source water. A utility may install a continuous monitoring system that will provide real time information regarding water quality conditions. This would require utilities to analyze the data to establish what condition is indicative of a contamination event. Continuous monitoring will provide results for a predetermined set of parameters. The more parameters that are being monitored, the more sophisticated the monitoring equipment will need to be. When establishing a continuous monitoring system, the utility should consider the logistics of placing and maintaining the equipment, and receiving output data from the equipment.

Alternately, or in addition, a utility may also pull periodic grab samples on a regular basis, or in case of a reported incident. The grab samples may be analyzed for specific contaminants. A utility should examine their PSSCs to determine what chemical contaminants could pose a threat to the water source. If possible, the utility should plan in advance how those contaminants will be detected. Consideration should be given to where samples will be collected, the preservations and hold times for samples, available laboratories to analyze samples, and costs associated with the sampling event. Regardless of the type of monitoring (continuous or grab), utilities should collect samples for their source throughout the year to better understand the baseline water quality conditions and natural seasonal fluctuations. Establishing a baseline will help determine if changes in the water quality are indicative of a contamination event and inform the needed response.

Every utility should establish a system or process for receiving or detecting chemical threats with sufficient time to respond to protect the treatment facility and public health. All approaches to receiving and responding to an early warning should incorporate communication with facility owners and operators that pose a threat to the water quality, with state and local emergency response agencies, with surrounding water utilities, and with the public. Communication plays an important role in knowing how to interpret data and how to respond.

Pine Grove Water has analyzed its ability to monitor for and detect potential contaminants that could impact its source water. Information regarding this utility's early warning monitoring system capabilities is provided in **Table 15** and in **Appendix B.**

Table 15. Early Warning Monitoring System Capabilities*

Does your system currently receive spill notifications from a state agency, neighboring water system, local emergency responders, or other facilities? If yes, from whom do you receive notices?		The utility receives spill notifications from the WV Health Department.
Are you aware of any facilities, land uses, or critical areas within your protection areas where chemical contaminants could be released or spilled?		No
Are you prepared to detect potential contaminants if notified of a spill?		Yes; the utility collects grab sample and tests for contaminant(s)
List laboratories (and contact information) on whom you would rely to analyze water samples in case of a reported spill.	**Laboratories**	
	Name	**Contact**
	REI Consultants	(304) 255-2500
	WV Office of Lab Services	(304) 558-3530
Do you have an understanding of baseline or normal conditions for your source water quality that accounts for seasonal fluctuations?		Yes
Does your utility currently monitor raw water (through continuous monitoring or periodic grab samples) at the surface water intake or from a groundwater source on a regular basis?		Yes; periodic grab samples
Provide or estimate the capital and O&M costs for your current or proposed early warning system or upgraded system.	**Monitoring System**	**Hach sc1000 (B-2)**
	Capital	$50,000
	Yearly O & M	$750
Do you serve more than 100,000 customers? If so, please describe the methods you use to monitor at the same technical levels utilized by ORSANCO.		No

*This information is from the 2016 Source Water Protection Contingency Plan for Pine Grove Municipal Water Works by The Thrasher Group, Inc. This document is attached in **Appendix D.** More information about the proposed monitoring system is included in **Appendix B. Early Warning Monitoring System Forms.**

12.0 SINGLE SOURCE FEASIBILITY STUDY

If a public water utility's water supply plant is served by a single–source intake to a surface water source of supply or a surface water influenced source of supply, the submitted source water protection plan must also include an examination and analysis of the technical and economic feasibility of alternative sources of water to provide continued safe and reliable public water service in the event that its primary source of supply is detrimentally affected by contamination, release, spill event or other reason. These alternatives may include a secondary intake, two days of additional raw or treated water storage, an interconnection with neighboring systems, or other options identified on a local level. Note: a suitable secondary intake would draw water supplies from a substantially different location or water source.

To accomplish this requirement, utilities should examine all existing or possible alternatives and rank them by their technical, economic, and environmental feasibility. To have a consistent and complete method for ranking alternatives, WVBPH has developed a feasibility study guide. This guide provides several criteria to consider for each category, organized in a Feasibility Study Matrix. By completing the Feasibility Study Matrix, utilities will demonstrate the process used to examine the feasibility of each alternative and document scores that compare the alternatives. The Feasibility Study matrix and summary of the results are presented in an alternatives feasibility study attached as **Appendix D**.

13.0 COMMUNICATION PLAN

Pine Grove Water has also developed a Communication Plan that documents the manner in which the public water utility, working in concert with state and local emergency response agencies, shall notify the local health agencies and the public of the initial spill or contamination event and provide updated information related to any contamination or impairment of the system's drinking water supply. The initial notification to the public will occur in any event no later than thirty minutes after the public water system becomes aware of the spill, release, or potential contamination of the public water system. A copy of the source water protection plan and the Communication Plan has been provided to the local fire department. Pine Grove Water will update the Communication Plan as needed to ensure contact information is up to date.

Procedures should be in place to effectively react to the kinds of catastrophic spills that can reasonably be predicted at the source location or within the SWPA. The chain-of-command, notification procedures and response actions should be known by all water system employees.

The WVBPH has developed a recommended communication plan template that provides a tiered incident communication process to provide a universal system of alert levels to utilities and water system managers. The comprehensive Communication Plan for Pine Grove Water is attached as **Appendix C** for internal review and planning purposes only.

The West Virginia Department of Environmental Protection is capable of providing expertise and assistance related to prevention, containment, and clean-up of chemical spills. The West Virginia Department of Environmental Protection Emergency Response 24-hour Phone is 1-800-642-3074. The West Virginia Department of Environmental Protection also operates an upstream distance estimator that can be used to determine the distance from a spill site to the closest public water supply surface water intake.

14.0 EMERGENCY RESPONSE SHORT FORM

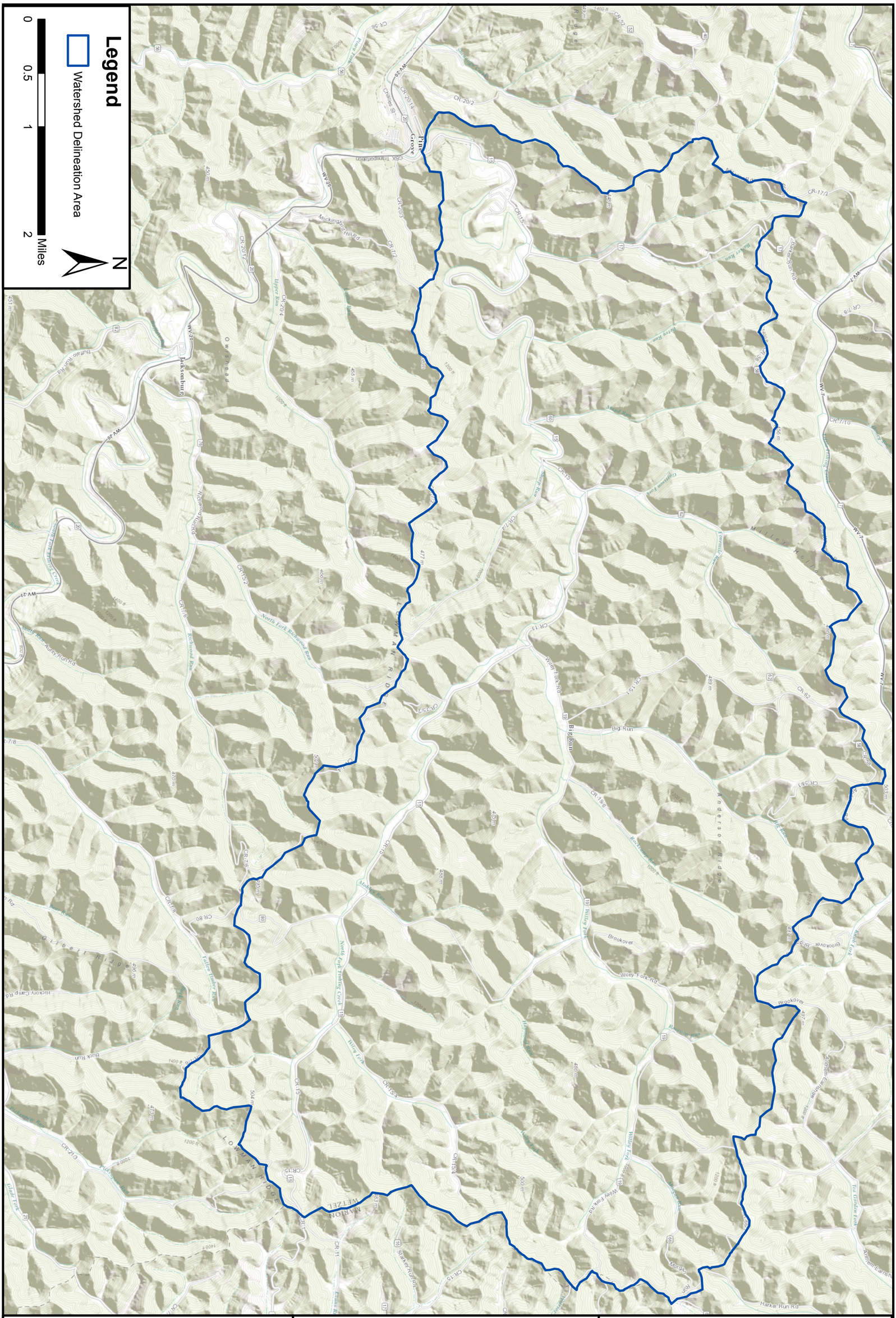
A public water utility must be prepared for any number of emergency scenarios and events that would require immediate response. It is imperative that information about key contacts, emergency services, and downstream water systems be posted and readily available in the event of an emergency. Elements of this source water protection plan, such as the contingency planning and communication plan, may contain similar information to the utility's emergency response plan. However, the emergency response plan is to be kept confidential and is not included in this source water protection plan. An Emergency Short Form is included in **Appendix C** to support the Communicate Plan by providing quick access to important information about emergency response and are to be used for internal review and planning purposes only.

15.0 CONCLUSION

This report represents a detailed explanation of the required elements of Pine Grove Water's Source Water Protection Plan. Any supporting documentation or other materials that the utility considers relevant to their plan can be found in **Appendix E**.

This source water protection plan is intended to help prepare community public water systems all over West Virginia to properly handle any emergencies that might compromise the quality of the system's source water supply. It is imperative that this plan is updated as often as necessary to reflect the changing circumstances within the water system. The protection team should continue to meet regularly and continue to engage the public whenever possible. Communities taking local responsibility for the quality of their source water is the most effective way to prevent contamination and protect a water system against contaminated drinking water. Community cooperation, sufficient preparation, and accurate monitoring are all critical components of this source water protection plan, and a multi-faceted approach is the only way to ensure that a system is as protected as possible against source water degradation.

APPENDIX A. FIGURES



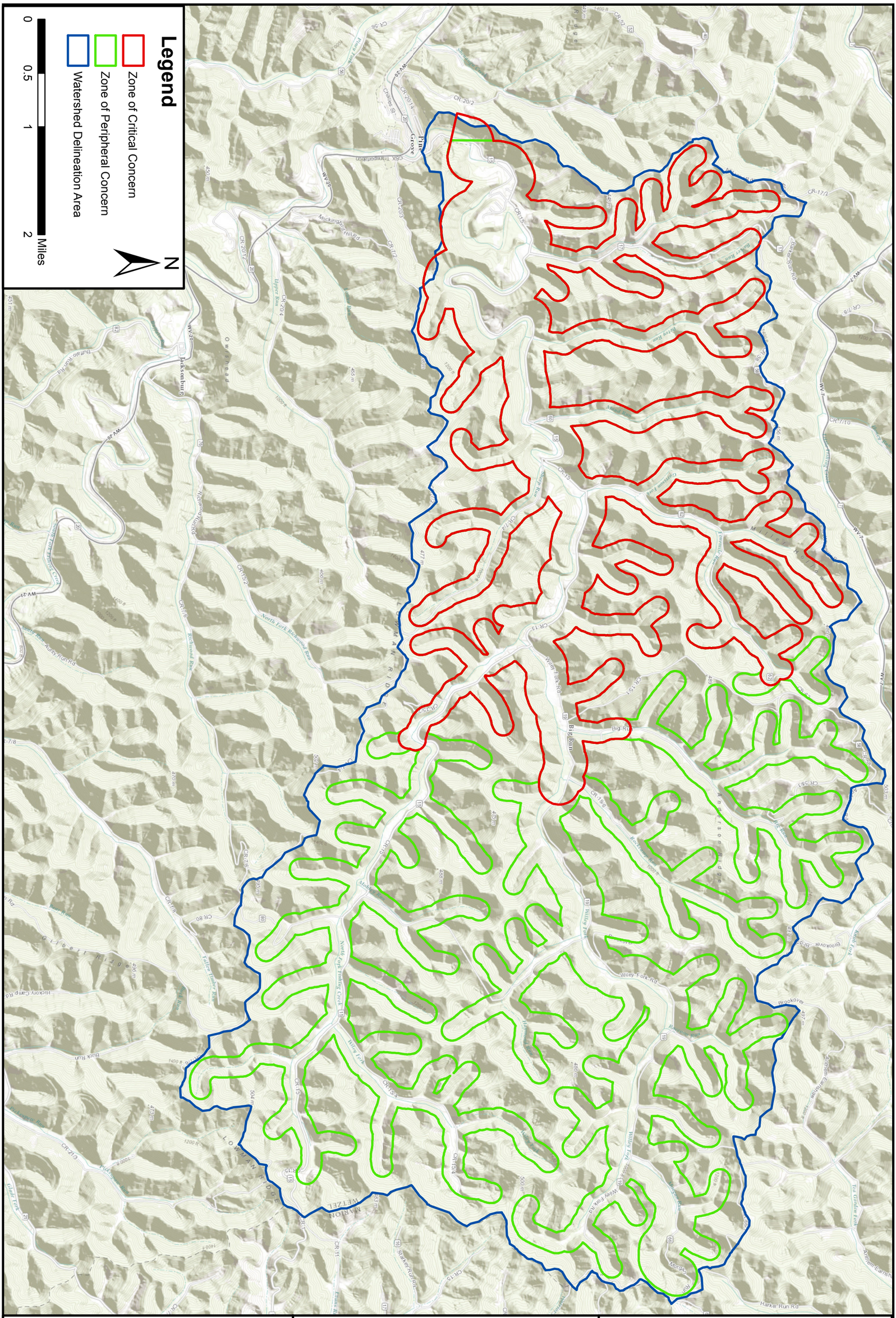
TETRA TECH
803 Quarrier Street, Suite 400
Charleston, WV 25301

Pine Grove Water
PWSID: WV3305205
Source Water Protection Plan

Figure A-1. Watershed Delineation Area

CREATED BY: CEM

DATE:05/24/16



TETRA TECH
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Charleston, WV 25301

Pine Grove Water
PWSID: WV3305205
Source Water Protection Plan

Figure A-2. Zone of Critical Concern/ Zone of Peripheral Concern

CREATED BY: CEM | DATE:05/24/16

Figure A-3. PSSCs in the Watershed Delineation Area

CREATED BY: CEM

DATE:05/24/16

Pine Grove Water
PWSID: WV3305205
Source Water Protection Plan

TETRA TECH
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Legend

N

- EPA Regulated Sites
- Leaking Underground Storage Tanks
- NPDES Permits
- Oil and Gas Wells

Field Verified PSSCs

- Agriculture
- Commercial
- Industrial
- Municipal
- Residential
- Zone of Critical Concern
- Zone of Peripheral Concern
- Watershed Delineation Area

Miles

0 0.5 1 2

*Note: Aboveground Storage Tank locations do not appear on the figure and are to be kept confidential.

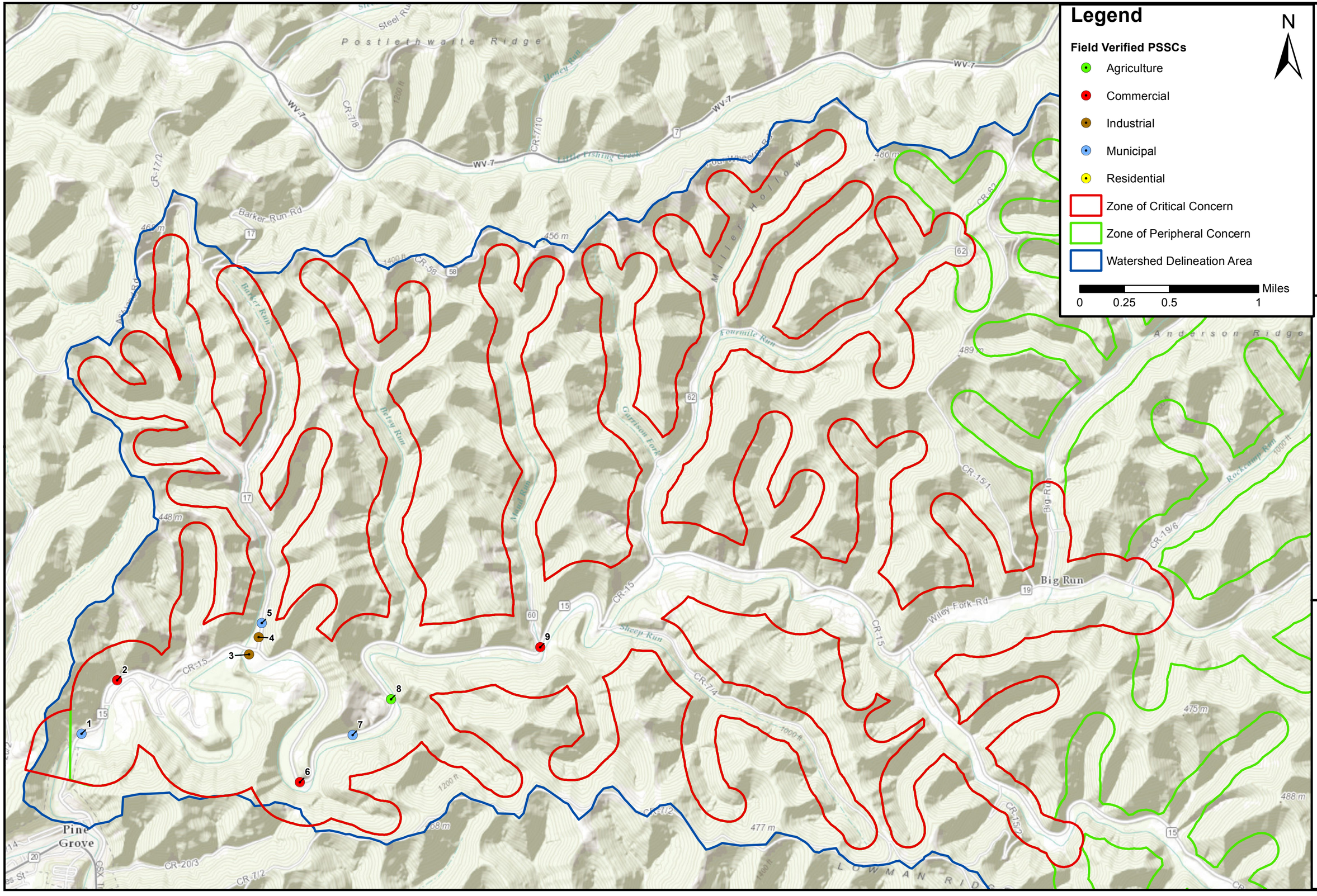


Figure A-4. Field Verified PSSCs

DATE:05/22/16

CREATED BY: CEM

Pine Grove Water
PWSID: WV3305205
Source Water Protection Plan

TETRA TECH
803 Quarrier Street, Suite 400
Charleston, WV 25301

Legend

N

- EPA Regulated Sites
- Leaking Underground Storage Tanks
- NPDES Permits
- Zone of Critical Concern
- Zone of Peripheral Concern
- Watershed Delineation Area

0 0.25 0.5 1 Miles

Figure A-5. Selected Sources: EPA Regulated Sites, Leaking Underground Storage Tanks, and NPDES Permits

DATE:05/25/16

CREATED BY: CEM

Pine Grove Water
PWSID: WV3305205
Source Water Protection Plan

TETRA TECH
803 Quarrier Street, Suite 400
Charleston, WV 25301

Legend

Oil and Gas Wells

- Conventional Wells
- Marcellus Wells
- Zone of Critical Concern
- Zone of Peripheral Concern
- Watershed Delineation Area

0 0.25 0.5 1 Miles

N

R-53 through R-57

R-50 through R-52

R-44 through R-49

R-37 through R-43

R-31 through R-36

R-20 through R-26

R-27 through R-30

R-58 through R-63

R-64 through R-66

Postlethwaite Ridge

Anderson Ridge

Lowman Ridge

Barker Run Rd

Miller Hollow

Fourmile Run

Little Fishing Creek

Sheep Run

Wiley Fork Rd

Big Run

Pine Grove

WV-7

CR-17/2

CR-718

CR-7/10

CR-58

CR-15

CR-13

CR-15/1

CR-15/2

CR-19/6

CR-20/3

CR-7/2

CR-7/4

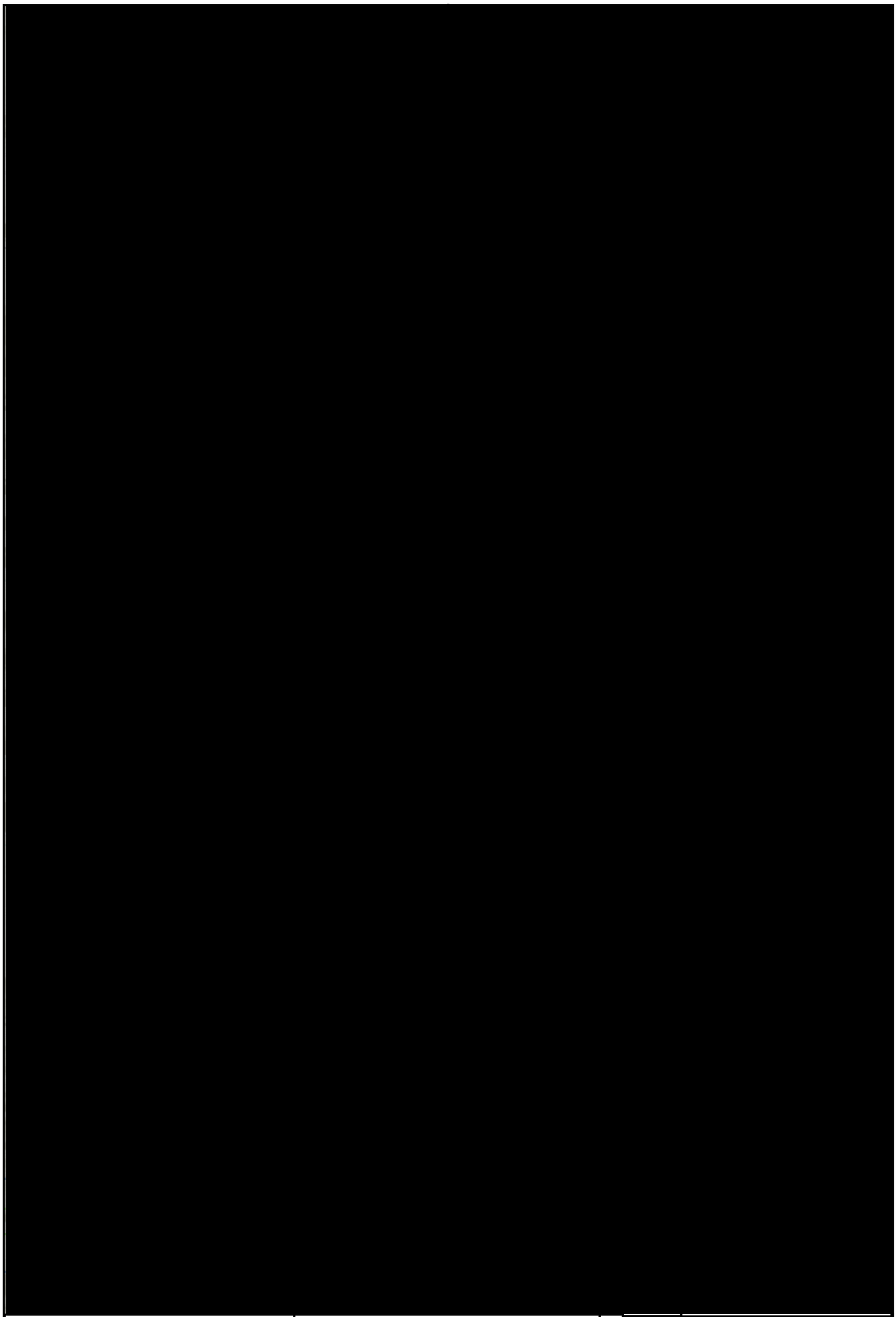
Figure A-6. Selected Sources: Oil and Gas Wells

DATE:05/25/16

CREATED BY: CEM

Pine Grove Water
PWSID: WV3305205
Source Water Protection Plan

TETRA TECH
803 Quarrier Street, Suite 400
Charleston, WV 25301



TETRA TECH
803 Quarrier Street, Suite 400
Charleston, WV 25301

Pine Grove Water
PWSID: WV3305205
Source Water Protection Plan

Figure A-6. Selected Sources: Aboveground Storage Tanks

CREATED BY: CEM | DATE:06/02/16

List of Locally Identified PSSCs

Pine Grove PSSC Summary

Source Type	IN ZCC	AROUND ZCC	IN ZPC	AROUND ZPC	WATERSHED	TOTAL
Aboveground Storage Tanks	15	56	85	68	0	**224**
Oil/Gas Wells	142	186	139	73	0	**540**
Leaking Underground Storage Tanks	0	1	0	0	0	**1**
NPDES Permits	21	2	17	6	0	**46**
USEPA Regulated Sites	8	4	2	0	0	**14**
Field Verified PSSCs	9	0	0	0	0	**9**
Total	**195**	**249**	**243**	**147**	**0**	**834**

Field Verified PSSCs – Figure A-4

PSSC Number	Site Name	Site Description	Map Code	Comments
1	Pine Grove Water Treatment Plant	Drinking Water Treatment Plants	M-5	drinking WTP
2	Rush Construction Inc. (CS)	Construction areas	C-10	lot with garage and tanker trucks
3	Pine Grove Plant	Industrial pipelines	I-15	pipeline facilities, AGST
4	Oil Well (OGW)	Wells: Injection	I-39	Penzoil AST and well
5	County Route 17 / Barker Road	Highway	M-7	highway
6	Jolliffe Cemetary	Cemeteries	C-9	cemetery
7	County Route 15	Highway	M-7	highway
8	Quaker State Products	Other animal facilities	A-17	animal feeding farm
9	Above Ground Storage Tank	Above Ground Storage Tanks	C-1	abandoned AGST

USEPA Regulated Sites – Figure A-5

R-Value	Registry ID	Primary Name	Registry Number
R-1	110055000000	MAIN STREET BRIDGE S352-2	110054989205
R-2	110055000000	NORTH FORK BRIDGE S352-15-	110054996340

R-Value	Registry ID	Primary Name	Registry Number
R-3	110046000000	TL-377 PIPELINE REPLACEMENT	110045961839
R-4	110046000000	TL-377 PIPELINE REPLACEMENT PR	110045960769
R-5	110001000000	DOMINION GAS TRANSMISSION EXTRACTION PLANT	110000711551
R-6	110055000000	LEMASTERS BRIDGE, S352-17-1.07	110055014862
R-7	110046000000	HOYT RIDGE STAGING AREA NO. 1	110046143516
R-8	110047000000	DALLISON LUMBER ACCESS ROAD CO	110046603270
R-9	110055000000	24 BROWN2 (210141)	110055026225
R-10	110028000000	NEW MARTINSVILLE HANNIBAL HYDRO	110028046013
R-11	110055000000	24 BARR3 (210141)	110055026190
R-12	110055000000	FOUR MILE RUN BRIDGE, S352-15-	110054967835

*12 of 14 total sites were prioritized and labeled in this analysis due to their potential threat or proximity to the intake. Only sites that lie in or around the ZCC were prioritized. The remaining points in the watershed should still be considered by the water system but were not prioritized in this analysis.

Leaking Underground Storage Tanks – Figure A-5

R-13	**JAY ARMAN ESSO (FORMER)**	**5210440**	**08/18/2014**

NPDES Permits – Figure A-5

R-Value	Permit ID	Facility Name	Responsible Party	Permit Type
R-14	WVR105380	TL-377 PIPELINE REPLACEMENT PROJECT	DOMINION TRANSMISSION INC	Industrial
R-15	WVR106279	Dallison Lumber Access Road Construction	DALLISON LUMBER CO.	Industrial
R-16	WVR107048	406 Fill Area	AMERICAN ENERGY-MARCELLUS, LLC	Industrial
R-17	WVR310085	Hoyt Gathering Pipeline	AMERICAN ENERGY-MARCELLUS, LLC	Industrial
R-18	WVR310057	EQT MOME-S008 Pipeline	EQT GATHERING LLC	Industrial
R-19	WVG670592	MOMES008	EQT GATHERING LLC	Industrial

*6 of 46 total sites were prioritized and labeled in this analysis due to their potential threat or proximity to the intake. Only sites that lie in or around the ZCC were prioritized. The remaining points in the watershed should still be considered by the water system but were not prioritized in this analysis.

Oil and Gas Wells – Figure A-6

R-Value	Permit ID	Responsible Party	Farm Name	Marcellus
R-20	10302880	HG ENERGY, LLC	BROWN, FRANCIS D. & FREEDA	Yes
R-21	10302854	HG ENERGY, LLC	BROWN, FRANCIS D. & FREEDA	Yes
R-22	10302882	HG ENERGY, LLC	BROWN, FRANCIS D. & FREEDA	Yes
R-23	10302883	HG ENERGY, LLC	BROWN, FRANCIS D. & FREEDA	Yes
R-24	10302878	HG ENERGY, LLC	BROWN, FRANCIS D. & FREEDA	Yes
R-25	10302881	HG ENERGY, LLC	BROWN, FRANCIS D. & FREEDA	Yes
R-26	10302879	HG ENERGY, LLC	BROWN, FRANCIS D. & FREEDA	Yes
R-27	10302887	HG ENERGY, LLC	BROWN, FRANCIS D. & FREEDA	Yes
R-28	10302888	HG ENERGY, LLC	BROWN, FRANCIS D. & FREEDA	Yes
R-29	10302890	HG ENERGY, LLC	BROWN, FRANCIS D. & FREEDA	Yes
R-30	10302889	HG ENERGY, LLC	BROWN, FRANCIS D. & FREEDA	Yes
R-31	10302747	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-32	10302745	HG ENERGY, LLC	DALLISON LUMBER, INC.	Yes
R-33	10302743	HG ENERGY, LLC	DALLISON LUMBER, INC.	Yes
R-34	10302746	HG ENERGY, LLC	DALLISON LUMBER, INC.	Yes
R-35	10302748	HG ENERGY, LLC	DALLISON LUMBER, INC.	Yes
R-36	10302744	HG ENERGY, LLC	DALLISON LUMBER, INC.	Yes
R-37	10302643	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-38	10302641	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-39	10302566	EAST RESOURCES, INC.	DALLISON LUMBER INC	Yes
R-40	10302646	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-41	10302644	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-42	10302645	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-43	10302642	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-44	10302638	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-45	10302639	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-46	10302635	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-47	10302640	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-48	10302637	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes

R-Value	Permit ID	Responsible Party	Farm Name	Marcellus
R-49	10302636	HG ENERGY, LLC	DALLISON LUMBER INC.	Yes
R-50	10302974	HG ENERGY, LLC	YOHO, BERNARD LEE, JR.	Yes
R-51	10302978	HG ENERGY, LLC	YOHO, BERNARD LEE JR.	Yes
R-52	10302977	HG ENERGY, LLC	YOHO, BERNARD LEE, JR.	Yes
R-53	10303026	HG ENERGY, LLC	DULANEY, DALE K.	Yes
R-54	10302987	HG ENERGY, LLC	DULANEY, DALE K.	Yes
R-55	10302986	HG ENERGY, LLC	DULANEY, DALE K.	Yes
R-56	10303027	HG ENERGY, LLC	DULANEY, DALE K.	Yes
R-57	10302975	HG ENERGY, LLC	DULANEY, DALE K.	Yes
R-58	10302802	EQT PRODUCTION COMPANY	EDGELL, KATHY S.	Yes
R-59	10302897	EQT PRODUCTION COMPANY	EDGELL, KATHY S.	Yes
R-60	10302871	EQT PRODUCTION COMPANY	EDGELL, KATHY S.	Yes
R-61	10302808	EQT PRODUCTION COMPANY	EDGELL, KATHY S.	Yes
R-62	10302807	EQT PRODUCTION COMPANY	EDGELL, KATHY S.	Yes
R-63	10302806	EQT PRODUCTION COMPANY	NANCY & JOHN FOUT, ET AL	Yes
R-64	10303001	EQT PRODUCTION COMPANY	COASTAL FOREST RESOURCES C	Yes
R-65	10302985	EQT PRODUCTION COMPANY	COASTAL TIMBERLANDS CO.	Yes
R-66	10302984	EQT PRODUCTION COMPANY	COASTAL TIMBERLANDS CO.	Yes

*71 of 224 total sites were prioritized and labeled in this analysis due to their potential threat or proximity to the intake. In addition, only Marcellus Shale wells that lie in or around the ZCC were prioritized. The remaining points in the watershed should still be considered by the water system but were not prioritized in this analysis.

Aboveground Storage Tanks – Figure A-7

R-Value	Responsible Party	Facility Name	Tank Label	Year	Capacity
R-67	BFS PETROLEUM PRODUCTS INC	Rush Construction	999-00000343	2011	[redacted]
R-68	HARRIS OIL COMPANY	HG ENERGY	052-00000957	1995	
R-69	AMERICAN ENERGY-MARCELLUS, LLC	American Energy-Marcellus	052-00000234	2010	
R-70	AMERICAN ENERGY-MARCELLUS, LLC	American Energy-Marcellus	052-00000254	1950	
R-71	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000342	2013	
R-72	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000319	2013	

R-Value	Responsible Party	Facility Name	Tank Label	Year	Capacity
R-73	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000309	2013	[redacted]
R-74	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000310	2013	
R-75	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000331	2013	
R-76	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000301	2013	
R-77	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000305	2013	
R-78	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000313	2013	
R-79	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000327	2013	
R-80	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000347	2013	
R-81	HG ENERGY, LLC	Wolf Summit	052-00000997	1987	
R-82	HG ENERGY, LLC	Wolf Summit	052-00000996	1987	
R-83	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000343	2013	
R-84	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000691	2014	
R-85	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000336	2012	
R-86	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000312	2012	
R-87	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000339	2012	
R-88	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000315	2012	
R-89	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000320	2012	
R-90	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000332	2012	
R-91	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000346	2012	
R-92	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000300	2012	
R-93	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000324	2012	
R-94	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000314	2012	
R-95	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000306	2013	
R-96	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000316	2013	
R-97	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000340	2013	
R-98	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000323	2013	
R-99	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000296	2013	
R-100	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000329	2013	
R-101	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000299	2013	
R-102	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000335	2013	

R-Value	Responsible Party	Facility Name	Tank Label	Year	Capacity
R-103	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000321	2013	[redacted]
R-104	AMERICAN ENERGY-MARCELLUS, LLC	American Energy - Marcellus	052-00000341	2013	
R-105	AMERICAN ENERGY-MARCELLUS, LLC	American Energy-Marcellus	052-00000224	2011	
R-106	WILLIAMS OHIO VALLEY MIDSTREAM LLC	Hoyt Facility	052-00000946	2013	
R-107	WILLIAMS OHIO VALLEY MIDSTREAM LLC	Hoyt Facility	052-00000947	2013	
R-108	WILLIAMS OHIO VALLEY MIDSTREAM LLC	Hoyt Facility	052-00000945	2013	
R-109	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001021	2012	
R-110	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001018	2012	
R-111	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001010	2012	
R-112	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001019	2012	
R-113	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001011	2012	
R-114	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001016	2012	
R-115	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001022	2012	
R-116	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001017	2012	
R-117	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001014	2012	
R-118	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001020	2012	
R-119	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001015	2012	
R-120	STRAD ENERGY SERVICES	HG Energy Had 105 Criswell Pad	999-00001012	2012	
R-121	AMERICAN ENERGY-MARCELLUS, LLC	American Energy-Marcellus	052-00000252	2014	
R-122	AMERICAN ENERGY-MARCELLUS, LLC	American Energy-Marcellus	052-00000233	2011	
R-123	AMERICAN ENERGY-MARCELLUS, LLC	American Energy-Marcellus	052-00000232	2011	
R-124	AMERICAN ENERGY-MARCELLUS, LLC	American Energy-Marcellus	052-00000253	1973	
R-125	DAC ENERGY, LLC	DAC ENERGY, LLC	052-00000125	2004	
R-126	AMERICAN ENERGY-MARCELLUS, LLC	American Energy-Marcellus	052-00000250	2011	
R-127	HARRIS OIL COMPANY	HG ENERGY	999-00001406	2011	
R-128	EQT PRODUCTION COMPANY	Weston Production District BIG 7	052-00000415	2013	
R-129	EQT PRODUCTION COMPANY	Weston Production District BIG 7	052-00000418	2013	
R-130	EQT PRODUCTION COMPANY	Weston Production District BIG 7	052-00000416	2013	
R-131	EQT PRODUCTION COMPANY	Weston Production District BIG 7	052-00000413	2013	
R-132	EQT PRODUCTION COMPANY	Weston Production District BIG 7	052-00000414	2013	

R-Value	Responsible Party	Facility Name	Tank Label	Year	Capacity
R-133	EQT PRODUCTION COMPANY	Weston Production District BIG 7	052-00000417	2013	[redacted]
R-134	EQT PRODUCTION COMPANY	Weston Production District	052-00000535	2013	
R-135	BERRY ENERGY, INC.	API 4710302152 Berry Energy Sell B788	052-00000787	2006	
R-136	BERRY ENERGY, INC.	API 4710302152 Berry Energy Well B788	052-00000759	1984	
R-137	BERRY ENERGY, INC.	API 4710301976 Berry Energy Well B748	052-00000760	2003	
R-138	DAC ENERGY, LLC	DAC ENERGY, LLC	052-00000165	2009	
R-139	DAC ENERGY, LLC	DAC ENERGY, LLC	052-00000022	2009	
R-140	DAC ENERGY, LLC	DAC ENERGY, LLC	052-00000108	2009	
R-141	DAC ENERGY, LLC	DAC ENERGY, LLC	052-00000030	2009	
R-142	EQT GATHERING LLC	NWV Pipeline Tanks	052-00000263	1970	
R-143	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000560	2012	
R-144	EQT PRODUCTION COMPANY	Madison Production District	052-00000512	2012	
R-145	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000516	2011	
R-146	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000552	2012	
R-147	EQT PRODUCTION COMPANY	Brenton Production District	052-00000259	2008	
R-148	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000559	2012	
R-149	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000526	2011	
R-150	EQT PRODUCTION COMPANY	Madison Production District	052-00000511	2000	
R-151	EQT PRODUCTION COMPANY	Brenton Production District	052-00000260	2008	
R-152	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000518	2011	
R-153	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000543	2013	
R-154	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000561	2012	
R-155	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000517	2011	
R-156	EQT PRODUCTION COMPANY	Brenton Production District	052-00000257	2008	
R-157	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000525	2013	
R-158	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000524	2011	
R-159	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000553	2013	
R-160	EQT PRODUCTION COMPANY	Brenton Production District	052-00000258	2008	
R-161	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000520	2011	
R-162	EQT PRODUCTION COMPANY	Brenton Production District	052-00000261	2008	

R-Value	Responsible Party	Facility Name	Tank Label	Year	Capacity
R-163	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000542	2012	[redacted]
R-164	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000521	2013	
R-165	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000541	2013	
R-166	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000515	2013	
R-167	EQT PRODUCTION COMPANY	Madison Production District	052-00000514	2000	
R-168	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000527	2013	
R-169	EQT PRODUCTION COMPANY	Madison Production District	052-00000513	2012	
R-170	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000554	2012	
R-171	EQT PRODUCTION COMPANY	Brenton Production District	052-00000262	2008	
R-172	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000544	2009	
R-173	EQT PRODUCTION COMPANY	Weston ProductionDistrict	052-00000549	2013	
R-174	DIVERSIFIED RESOURCES, INC.	Diversified Resources Tanks	052-00000478	1995	
R-175	MARKWEST LIBERTY MIDSTREAM & RESOURCES LLC	Mobley Gas Plant	052-00000743	2013	
R-176	MARKWEST LIBERTY MIDSTREAM & RESOURCES LLC	Mobley Gas Plant	052-00000744	2014	
R-177	MARKWEST LIBERTY MIDSTREAM & RESOURCES LLC	Mobley Gas Plant	052-00000740	2012	
R-178	MARKWEST LIBERTY MIDSTREAM & RESOURCES LLC	Mobley Gas Plant	052-00000741	2012	
R-179	MARKWEST LIBERTY MIDSTREAM & RESOURCES LLC	Mobley Gas Plant	052-00000742	2012	
R-180	MARKWEST LIBERTY MIDSTREAM & RESOURCES LLC	Mobley Gas Plant	052-00000735	2011	
R-181	MARKWEST LIBERTY MIDSTREAM & RESOURCES LLC	Mobley Gas Plant	052-00000736	2013	
R-182	MARKWEST LIBERTY MIDSTREAM & RESOURCES LLC	Mobley Gas Plant	052-00000738	2013	
R-183	MARKWEST LIBERTY MIDSTREAM & RESOURCES LLC	Mobley Gas Plant	052-00000739	2012	
R-184	MARKWEST LIBERTY MIDSTREAM & RESOURCES LLC	Mobley Gas Plant	052-00000737	2012	
R-185	GUTTMAN OIL CO	J.F. Allen - Mobley jobsite	052-00000924	2010	
R-186	EQT GATHERING LLC	Mercury Dehy Station	052-00000594	2013	
R-187	EQT PRODUCTION COMPANY	Weston Production District	052-00000530	2012	
R-188	EQT PRODUCTION COMPANY	Weston Production District	052-00000534	2012	
R-189	EQT GATHERING LLC	Mercury Dehy Station	052-00000596	2013	
R-190	EQUITRANS, L P	Logansport Compressor Station	052-00000607	2008	
R-191	EQUITRANS, L P	Logansport Compressor Station	052-00000608	2008	
R-192	EQUITRANS, L P	Logansport Compressor Station	052-00000605	1998	

R-Value	Responsible Party	Facility Name	Tank Label	Year	Capacity
R-193	EQUITRANS, L P	Logansport Compressor Station	052-00000606	1992	[redacted]
R-194	MAXUM PETROLUEM PRODUCTS, INC.	EQT-Logansport Compressor Station	052-00000682	2008	
R-195	MAXUM PETROLUEM PRODUCTS, INC.	EQT-Mercury Station	052-00000681	2011	
R-196	EQT GATHERING LLC	Mercury Dehy Station	052-00000597	2011	
R-197	EQT GATHERING LLC	Mercury Dehy Station	052-00000595	2011	
R-198	EQT GATHERING LLC	Mercury Dehy Station	052-00000592	2011	
R-199	EQT GATHERING LLC	Mercury Dehy Station	052-00000593	2013	
R-200	EQT PRODUCTION COMPANY	Weston Production District	052-00000532	2010	

*134 of 224 total sites were prioritized and labeled in this analysis due to their potential threat or proximity to the intake. In addition, only points that lie in or around the ZCC were prioritized. The remaining points in the watershed should still be considered by the water system but were not prioritized in this analysis.

APPENDIX B. EARLY WARNING MONITORING SYSTEM FORMS

Appendix B- Form B
Proposed Early Warning Monitoring System Worksheet- Surface Water Source*

Describe the type of early warning detection equipment that could be installed, including the design.
The early warning detection equipment that could be installed includes a level controller, display module, back panel, level & trough (see cost estimate by Hach Company in Appendix D) along with conductivity, oil-in-water, ORP, and pH sensors.
Where would the equipment be located?
The early warning monitoring system would be located upstream of the raw water intake on North Fork Fishing Creek
What would the maintenance plan for the monitoring equipment entail?
The proposed maintenance plan for the monitoring equipment shall consist of annual cleaning and/or exchanging of the probe(s) for the controller. Periodic calibration of the unit may also be required.
Describe the proposed sampling plan at the monitoring site.
Sampling of water quality data occurs every fifteen (15) minutes. Pine Grove would need to retrieve data from the “History” of the controller data collector twice per month.
Describe the proposed procedures for data management and analysis.
Data management for the early warning monitoring system consists of data points (up to 500 points or approximately six months per probe) being recorded in the “History” of the controller data collector. To access the “History”, the probe has to be plugged into the controller. Data is able to be removed via USB or through a local SCADA system.

*This information is from the 2016 Source Water Protection Contingency Plan for Pine Grove Municipal Water Works by The Thrasher Group, Inc. This document is attached in **Appendix D.**

APPENDIX C. COMMUNICATION PLAN TEMPLATE

Pine Grove Water

PWSID: WV3305205

Administrative Contact: Tim Flint

Contact Phone Number: 304-780-6512

Contact Email Address: timflint2003@yahoo.com

Plan Developed: July 2016

ACKNOWLEDGMENTS:

This plan was developed by Pine Grove Water Department to meet certain requirements of the Source Water and Assessment Protection Program (SWAPP) and the State of West Virginia, as directed by state laws and regulations.

TABLE OF CONTENTS

INTRODUCTION

Legislative Rule 64CSR3 requires public water systems to develop a Communication Plan that documents how public water suppliers, working in concert with state and local emergency response agencies, shall notify state and local health agencies and the public in the event of a spill or contamination event that poses a potential threat to public health and safety. The plan must indicate how the public water supplier will provide updated information, with an initial notification to the public to occur no later than thirty minutes after the supplier becomes aware that the spill, release or potential contamination of the public water system poses a potential threat to public health and safety.

The public water system has responsibility to communicate to the public, as well as to state and local health agencies. This plan is intended to comply with the requirements of Legislative Rule 64CSR3, and other state and federal regulations.

TIERS REPORTING SYSTEM

This water system has elected to use the *Tiered Incident / Event Reporting System* (TIERS) for communicating with the public, agencies, the media, and other entities in the event of a spill or other incident that may threaten water quality. TIERS provides a multi-level notification framework, which escalates the communicated threat level commensurate with the drinking water system risks associated with a particular contamination incident or event. TIERS also includes a procedural flow chart illustrating key incident response communication functions and how they interface with overall event response / incident management actions. Finally, TIERS identifies the roles and responsibilities for key people involved in risk response, public notification, news media and other communication.

TIERS provides an easy-to-remember five-tiered **A-B-C-D-E** risk-based incident response communication format, as described below. Table 1 provides also associated risk levels.

A = **A**nnouncement. The water system is issuing an announcement to the public and public agencies about an incident or event that may pose a threat to water quality. Additional information will be provided as it becomes available. As always, if water system customers notice anything unusual about their water, they should contact the water system

B = **B**oil Water Advisory. A boil water advisory has been issued by the water system. Customers may use the water for showering, bathing, and other non-potable uses, but should boil water used for drinking or cooking.

C = **C**annot Drink. The water system asks that users not drink or cook with the water at this time. Non-potable uses, such as showering, bathing, cleaning, and outdoor uses are not affected.

D = **D**o Not Use. An incident or event has occurred affecting nearly all uses of the water. Do not use the water for drinking, cooking, showering, bathing, cleaning, or other tasks where water can come in contact with your skin. Water can be used for flushing commodes and fire protection.

E = **E**mergency. Water cannot be used for any reason.

Tier	Tier Category	Risk Level	Tier Summary
A	**A**nnouncement	Low	The water system is issuing an announcement to the public and public agencies about an incident or event that could pose a threat to public health and safety. Additional information will be provided as it becomes available.
B	**B**oil Water Advisory	Moderate	Water system users are advised to boil any water to be used for drinking or cooking, due to possible microbial contamination. The system operator will notify users when the boil water advisory is lifted.

C	**C**annot Drink	High	System users should not drink or cook with the water until further notice. The water can still be used for showering, bathing, cleaning, and other tasks.
D	**D**o Not Use	Very High	The water should only be used for flushing commodes and fire protection until further notice. More information on this notice will be provided as soon as it is available.
E	**E**mergency	Extremely High	The water should not be used for any purpose until further notice. More information on this notice will be provided as soon as it is available.

COMMUNICATION TEAM

The Communication Team for the water system is listed in the table below, along with key roles. In the event of a spill or other incident that may affect water quality, the water system spokesperson will provide initial information, until the team assembles (if necessary) to provide follow-up communication.

Water system communication team members, organizations, and roles.

Team Member Name	Organization	Phone	Email	Role
Tim Flint	Pine Grove Water Department	304-780-6512	timflint2003@yahoo.com	Primary Spokesperson
Rhonda Spencer	Town of Pine Grove	304-889-3351	-	Secondary Spokesperson
Edgar Sapp	Wetzel County Office of Emergency Management	304-455-6960	wc911@frontier.com	Member
Barbara King	City Council	304-889-3246	-	Member
Tim Wilcox	Pine Grove Volunteer Fire Department	304-889-3353	-	Member

In the event of a spill, release, or other incident that may threaten water quality, members of the team who are available will coordinate with the management staff of the local water supplier to:

- Collect information needed to investigate, analyze, and characterize the incident/event
- Provide information to the management staff, so they can decide how to respond
- Assist the management staff in handling event response and communication duties
- Coordinate fully and seamlessly with the management staff to ensure response effectiveness

COMMUNICATION TEAM DUTIES

The communication team will be responsible for working cooperatively with the management staff and state and local emergency response agencies to notify local health agencies and the public of the initial spill or contamination event. The team will also provide updated information related to any contamination or impairment of the source water supply or the system's drinking water supply.

According to Legislative Rule 64CSR3, the initial notification to the public will occur no later than thirty minutes after the public water system becomes aware that the spill, release or potential contamination of the public water system poses a potential threat to public health and safety.

As part of the group implementing the Source Water Protection Plan, team members are expected to be familiar with the plan, including incident/event response and communication tasks. Specifically, team members should:

- Be knowledgeable on elements of the Source Water Protection Plan and Communication Plan
- Attend team meetings to ensure up-to-date knowledge of the system and its functions
- Participate in periodic exercises that "game out" incident response and communication tasks
- Help to educate local officials, the media, and others on source water protection
- Cooperate with water supplier efforts to coordinate incident response communication
- Be prepared to respond to requests for field investigations of reported incidents
- Not speak on behalf of the water supplier unless designated as the system's spokesperson

The primary spokesperson will be responsible for speaking on behalf of the water system to local agencies, the public, and the news media. The spokesperson should work with the management staff and the team to ensure that all communication is clear, accurate, timely, and consistent. The spokesperson may authorize and/or direct others to issue news releases or other information that has been approved by the system's management staff. The spokesperson is expected to be on call immediately when an incident or event which may threaten water quality occurs. The spokesperson will perform the following tasks in the event of a spill, release, or other event that threatens water quality:

- Announce which risk level (A, B, C, D, or E) will apply to the public notifications that are issued
- Issue news releases, updates, and other information regarding the incident/event
- Use the news media, email, social media, and other appropriate information venues
- Ensure that news releases are sent to local health agencies and the public
- Respond to questions from the news media and others regarding the incident/event
- Appear at news conferences and interviews to explain incident response, etc.

INCIDENT / EVENT COMMUNICATION PROCEDURE

The flow chart in this section illustrates how the water system will respond when it receives a report that a spill, release, or other contamination event may have occurred. Key elements of the flow chart are described below.

Communication with agencies, the public, and the media during threat incidents

Upon initial notification of the incident/event, system managers and staff will collect information and verify the need for further investigation. Only properly trained personnel will perform onsite investigations if permitted by emergency responders. If further investigation is warranted, and the initial facts support it, the water system spokesperson will issue a public communication statement consistent with the threat level. In addition, water system personnel and partners will be dispatched to conduct reconnaissance, a threat assessment, and a threat characterization, if present. This work may include:

- Verification of the incident/event type (spill, release, etc.)
- Location of incident/event
- Type of material(s) involved in spill, release, etc.
- Quantity of material involved
- Potential of the material to move, migrate, or be transported
- Relevant time factor(s) in the risk assessment (e.g., downstream movement rate)
- Overall level of risk to water system, whether low, moderate, high, or very high
- Development of the initial risk characterization

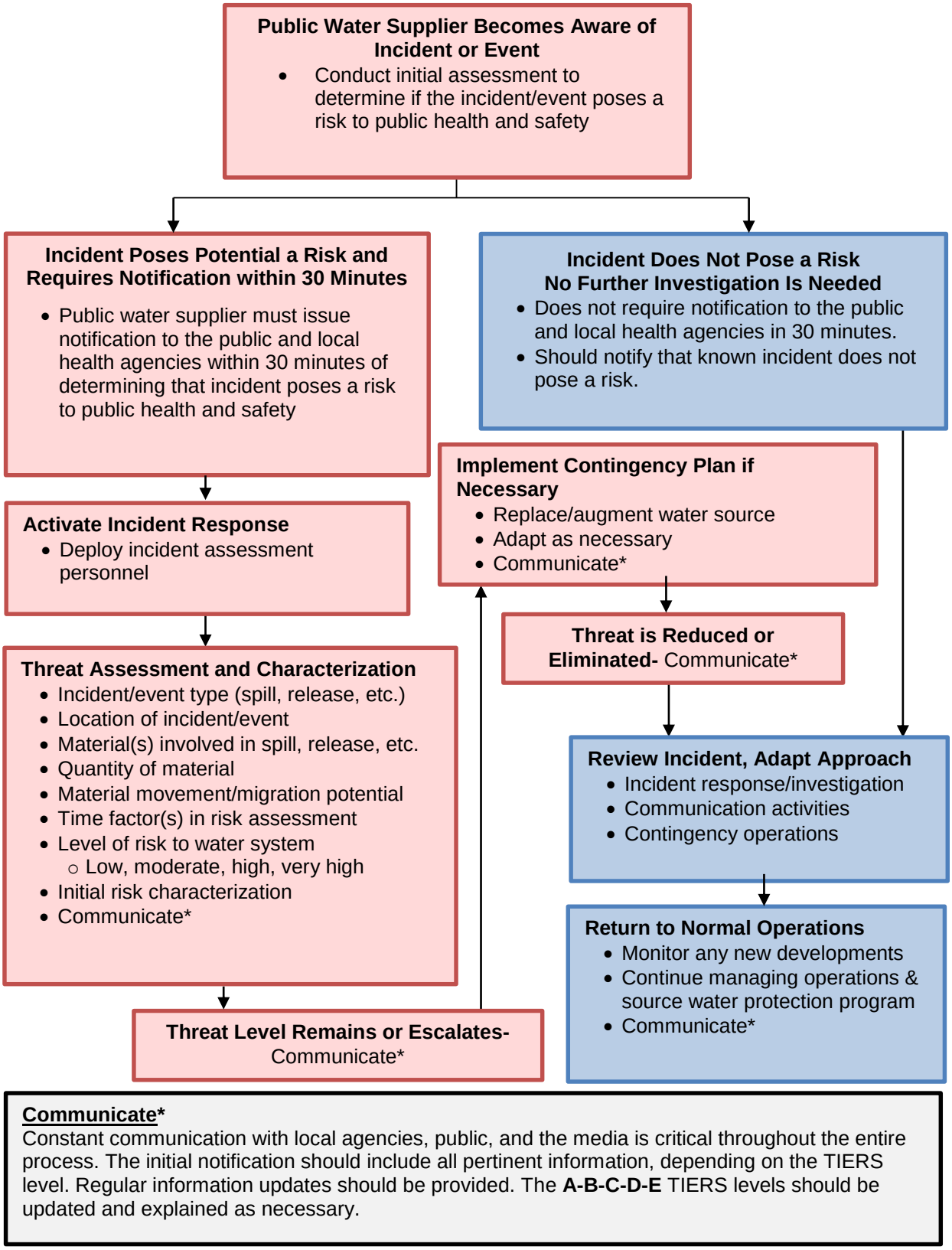
As the flow chart indicates, several iterative cycles will occur after the initial threat assessment, including communication with local agencies and the public, further investigation of the incident, possible implementation of the water system's contingency plan, and eventual elimination of the threat and a return to normal operations. Communication activities during this period will include:

- The initial release (i.e., **A**nnouncement, **B**oil Water Advisory, **C**annot Drink, **D**o Not Use, or **E**mergency)
  - Sent to local health agencies, the public, and the news media within 30 minutes
- Notification of the local water system's source water protection and communication teams
  - If warranted by initial findings regarding the spill, release, or incident
- Notification of the WV Bureau of Public Health
  - As required

- Periodic information updates, as incident response information is received
- Updates to the applicable A-B-C-D-E advisory tier, as necessary

After the threat level is reduced and operations return to normal, the water system staff, as well as the communication and source water protection teams and their partners, will conduct a post-event review and assessment. The purpose of the review is to examine the response to the incident, relevant communication activities, and overall outcomes. Plans and procedures may be updated, altered, or adapted based on lessons learned through this process.

TIERS FLOW CHART



EMERGENCY SHORT FORMS

Emergency Communication Information

	Name	Phone Number	Email
Designated spokesperson:	Tim Flint	304-780-6512	timflint2003@yahoo.com
Alternate spokesperson:	Rhonda Spencer	304-889-3351	-
Designated location to disseminate information to media:	Robert C. Byrd Center		
Methods of contacting affected residents:	Pine Grove Water primarily contacts affected residents about important information using television, door to door canvasing and word of mouth, Facebook, and the Wetzel County Code Red system. They can also use the town siren to alert residents about important events if needed.		

	Name	Title	Phone Number	Email
Media contacts:	WTRF	Television - Wheeling CBS Affiliate	304-232-7777	rlyons@wtrf.com
	WTOV	Television – Steubenville, OH NBC Affiliate	740-282-9999	newsdesk@wtov.com

Emergency Services Contacts

	Name	Emergency Phone	Alternate Phone	Email
Local Police	Wetzel County Sheriff Department	911	304-455-8212	-
Local Fire Department	Pine Grove Volunteer Fire Department	911	304-889-3353	-
Local Ambulance Service	Wetzel County Emergency Squad	911	304-889-3393	-

Hazardous Material Response Service	Pine Grove Volunteer Fire Department	911	304-889-3353	-

Sensitive Populations

Other communities that are served by the utility:	N/A		
Major user/sensitive population notification:	**Name**	**Emergency Phone**	**Alternate Phone**
	Valley High School	304-889-3151	-
	Pine Grove Health Clinic	304-889-3344	-
EED District Office Contact:	**Name**	**Phone**	**Email**
	Bob Smith	304-238-1145	robert.l.smith@wv.gov
OEHS Readiness Coordinator	Warren Von Dollen	304-356-4290 (main) 304-550-5607 (cell)	warren.r.vondollen@wv.gov
Alternate OEHS Phone Numbers	(304) 389-9318 (Brad Hess-State Cell) (304) 639-3652 (Brad Hess-Personnel Cell) (304) 843-1219 (Brad Hess-Home) (304) 312-0322 (Bob Smith-State Cell) (304) 281-7959 (Bob Smith-Personnel Cell) (304) 243-5802 (Bob Smith-Home) or (304) 558-2981 (OEHS Central Office)		

Downstream Water Contacts:	**Water System Name**	**Contact Name**	**Emergency Phone**	**Alternate Phone**
	Sistersville Water Department	-	304-652-2721	304-652-6361
Are you planning on implementing the TIER system?	Yes			

Key Personnel

	Name	Title	Phone	Email
Key staff responsible for coordinating emergency response procedures?	Tim Flint	Chief Operator	304-780-6512	timflint2003@yahoo.com
	Rhonda Spencer	Town Recorder	304-889-3351	-
Staff responsible for keeping confidential PSSC information and releasing to emergency responders:	Tim Flint	Chief Operator	304-780-6512	timflint2003@yahoo.com
	Rhonda Spencer	Town Recorder	304-889-3351	-

Emergency Response Information

	Name	Phone
List laboratories available to perform sample analysis in case of emergency:	REI Consultants	(304) 255-2500
	WV Office of Lab Services	(304) 558-3530
Has the utility developed a detailed Emergency Response Plan in accordance with the Public Health Security Bioterrorism Preparedness and Response Pan Act of 2002?	No. The water system is in the process of developing an ERP and hopes to have it complete by the end of 2016.	
When was the Emergency Response Plan developed or last updated?	N/A	

EMERGENCY CONTACT INFORMATION

State Emergency Spill Notification
1-800-642-3074

Office of Emergency Services
http://www.wvdhsem.gov/
Charleston, WV- (304) 558-5380

WV Bureau for Public Health Office of Environmental Health Services (OEHS)
www.wvdhhr.org/oehs

Readiness Coordinator- Warren Von Dollen
Phone; 304-356-4290
Cell; 304-550-5607
E-mail: warren.r.vondollen@wv.gov

Environmental Engineering Division Staff
Charleston, Central Office (304) 558-2981
Beckley, District 1 (304) 256-6666
St. Albans, District 2 (304) 722-0611
Kearneysville, District 4 (304) 725-9453
Wheeling, District 5 (304) 238-1145
Fairmont, District 6 (304) 368-2530

National Response Center - Chemical, Oil, & Chemical/Biological Terrorism
1-800-424-8802

WV State Fire Marshal's Office
1-800-233-3473

West Virginia State Police
1-304-746-2100

WV Watch – Report Suspicious Activity
1-866-989-2824

DEP Distance Calculator

http://tagis.dep.wv.gov/pswicheck/

PRESS RELEASE ATTACHMENTS

TIERS Levels A, B, C, D, and E

UTILITY ISSUED NOTICE – LEVEL A

PUBLIC WATER SYSTEM ANNOUNCEMENT

A WATER SYSTEM INVESTIGATION IS UNDERWAY

On _____ at ___:____ AM/PM, the _____ Water System began investigating an incident that may affect local water quality.

The incident involves the following situation at this location:

_____

_____

_____

There are no restrictions on water use at this time. As always, if water system customers notice anything unusual about their water – such as abnormal odors, colors, sheen, etc. – they should contact the water system at _____.

At this time there is no need for concern if you have consumed or used the water.

Regular updates will be provided about this Announcement as water system staff continue their investigation. Again, there are no restrictions on water use at this time.

State Water System ID# _____ Date Distributed: _____

UTILITY ISSUED NOTICE – LEVEL B

BOIL WATER ADVISORY

A BOIL WATER ADVISORY IS IN EFFECT

On _____ at ___:____ am/pm, a water problem occurred causing contamination of your water. The areas that are affected are as follows:

□ Entire Water System or □ Other: _____

_____

CONDITIONS INDICATE THERE IS A HIGH PROBABILITY THAT YOUR WATER IS CONTAMINATED. TESTING HAS NOT OCCURRED TO CONFIRM OR DENY THE PRESENCE OF CONTAMINATION IN YOUR WATER.

What should I do?

- **DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST.** Bring all water to a boil, let it boil for one minute, and let it cool before using, or use bottled water. Boiled or bottled water should be used for drinking, making ice, brushing teeth, washing dishes, bathing, and food preparation **until further notice**. Boiling kills bacteria and other organisms in the water.

What happened?

- **The problem is related to** _____

What is being done?

- **The water system is taking the following action:** _____

  _____

What should a customer do if they have consumed or used the water?

- _____

We will inform you when you no longer need to boil your water. We anticipate resolving the problem within _____ hours/days. For more information, please contact _____ at _____ or _____ at _____.

General guidelines on ways to lessen the health risk are available from the EPA Safe Drinking Water Hotline at 1 (800) 426-4791.

Please share this information others who use this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

UTILITY ISSUED NOTICE – LEVEL C
"CANNOT DRINK" WATER NOTIFICATION
A LEVEL C WATER ADVISORY IS IN EFFECT

On _____ at ___:____ am/pm, a water problem occurred causing contamination of your water. The areas that are affected are as follows:

□ Entire Water System or □ Other: _____

_____

CONDITIONS INDICATE THERE IS A HIGH PROBABILITY THAT YOUR WATER IS CONTAMINATED. TESTING HAS NOT OCCURRED TO CONFIRM OR DENY THE PRESENCE OF CONTAMINATION IN YOUR WATER.

What should I do?

- **DO NOT DRINK THE WATER.** You can't drink the water, but you can use it for showering, bathing, toilet-flushing, and other non-potable purposes.
- **BOILING WILL NOT PURIFY THE WATER.** Do not drink the water, even if it is boiled. The type of contamination suspected is not removed by boiling.

What happened?

- **The problem is related to** _____

What is being done?

- **The water system is taking the following action:** _____

  _____

What should a customer do if they have consumed or used the water?

- _____

We will inform you when the water is safe to drink. We anticipate resolving the problem within _____ hours/days. For more information – or to report unusual water conditions such as abnormal odors, colors, sheen, etc. – please contact _____ at _____ or _____ at _____.

Please share this information others who use this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

UTILITY ISSUED NOTICE – LEVEL D
"DO NOT USE" WATER NOTIFICATION
A LEVEL D WATER ADVISORY IS IN EFFECT

On _____ at ___:____ am/pm, a water problem occurred causing contamination of your water. The areas that are affected are as follows:

□ Entire Water System or □ Other: _____

_____

CONDITIONS INDICATE THERE IS A HIGH PROBABILITY THAT YOUR WATER IS CONTAMINATED. TESTING HAS NOT OCCURRED TO CONFIRM OR DENY THE PRESENCE OF CONTAMINATION IN YOUR WATER.

What should I do?

- **DO NOT DRINK THE WATER.** The water is contaminated.
- **DO NOT SHOWER OR BATHE IN THE WATER.** You can't use the water for drinking, showering, or bathing. It can be used for toilet flushing and firefighting.
- **BOILING WILL NOT PURIFY THE WATER.** Do not use the water, even if it is boiled. The type of contamination suspected is not removed by boiling.

What happened?

- **The problem is related to** _____

What is being done?

- **The water system is taking the following action:** _____

What should a customer do if they have consumed or used the water?

- _____

We will inform you when the water is safe to drink. We anticipate resolving the problem within _____ hours/days. For more information – or to report unusual water conditions such as abnormal odors, colors, sheen, etc. – please contact _____ at _____ or _____ at _____.

Please share this information others who use this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

UTILITY ISSUED NOTICE – LEVEL E
EMERGENCY WATER NOTIFICATION
A LEVEL E WATER ADVISORY IS IN EFFECT

On _____ at ___:____ am/pm, a water problem occurred causing contamination of your water. The areas that are affected are as follows:

□ Entire Water System or □ Other: _____

_____

CONDITIONS INDICATE THERE IS A HIGH PROBABILITY THAT YOUR WATER IS CONTAMINATED. TESTING HAS NOT OCCURRED TO CONFIRM OR DENY THE PRESENCE OF CONTAMINATION IN YOUR WATER.

What should I do?

- **DO NOT DRINK THE WATER.** The water is contaminated.
- **DO NOT USE THE WATER FOR ANY PURPOSE!** You can't use the water for drinking, showering, or bathing, or any other use – not even for toilet flushing.
- **BOILING WILL NOT PURIFY THE WATER.** Do not use the water, even if it is boiled. The type of contamination suspected is not removed by boiling.

What happened?

- **The problem is related to** _____

What is being done?

- **The water system is taking the following action:** _____

What should a customer do if they have consumed or used the water?

- _____

We will inform you when the water is safe to drink. We anticipate resolving the problem within _____ hours/days. For more information – or to report unusual water conditions such as abnormal odors, colors, sheen, etc. – please contact _____ at _____ or _____ at _____.

Please share this information others who use this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

APPENDIX D. SINGLE SOURCE FEASIBILITY STUDY

Source Water Protection Contingency Plan

Pine Grove Municipal Water Works

PWSID 3305205

Wetzel County, West Virginia

January 2016

THRASHER

SOURCE WATER PROTECTION

CONTINGENCY PLAN

FOR

PINE GROVE MUNICIPAL WATER WORKS

PWSID # WV3305205

WETZEL COUNTY, WEST VIRGINIA

JANUARY 2016

PREPARED BY:

THE THRASHER GROUP, INC.

THE THRASHER GROUP, INC. PROJECT # 101-010-0992.800

Prepared By:

THE THRASHER GROUP, INC.

600 White Oaks Boulevard
Bridgeport, West Virginia 26330
www.thrashereng.com
Phone: 304-624-4108

I certify the information in the Source Water Protection Contingency Plan is complete and accurate to the best of my knowledge.

Signature of authorized designee:

Print Name of Authorizing Signatory:

Title of Authorizing Signatory:

Date of Submission:

Funding By:

Office of Environmental Health Services
West Virginia Department of Health and Human Resources

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This Source Water Protection Contingency Plan (SWPCP) is being developed for Pine Grove Municipal Water Works (Pine Grove) in accordance with Senate Bill 373, and is to be included as a portion of the complete Source Water Protection Plan being completed by other parties (per the West Virginia Bureau for Public Health [WV BPH]).

Pine Grove is a state regulated public utility and operates a public water system serving the area of Pine Grove in Wetzel County, West Virginia. Pine Grove serves 271 residential customers, 31 commercial customers, two (2) industrial customers, and three (3) public authorities, as reported in the 2014 Annual Report to the WV Public Service Commission. Pine Grove does not provide water to nor purchase water from any other utility.

The water treatment facility for Pine Grove obtains surface water from one (1) raw water intake located on the North Fork Fishing Creek. The plant has a treatment capacity of 192,000 gallons per day and pumps approximately eight (8) hours per day on average. The facility currently produces an average of approximately 71,500 gallons per day of water. Pine Grove maintains two (2) treated water storage tanks totaling 250,000 gallons of treated water and one (1) raw water storage tank totaling 177,000 gallons of raw water.

Currently, the water system is experiencing 24.55% unaccounted for water; however, the utility is conducting leak detection and making necessary repairs to reduce unaccounted for water loss.

Pine Grove does not currently own a generator and, consequently, cannot sustain operation of the water treatment facility during power outages. As a result, the system is reliant on the existing treated water storage capacity to maintain water service during power outages. However, Pine Grove is able to coordinate with local Emergency Services to obtain a generator for use during prolonged periods of power disruption; thereby ensuring average water demands can be met in the event power service is disrupted at the water treatment facility.

Four (4) alternatives for maintaining water service in the event Pine Grove's primary source of water supply becomes contaminated were evaluated in this SWPCP. Pine Grove currently has one (1) alternative source of treated water in the form of an existing interconnection with Wetzel County Public Service District #1 (WCPSD1). This interconnection is capable of supplying Pine Grove's average water demand. To supply the full demand of Pine Grove, this interconnection requires upgrades.

In addition to maintaining the existing interconnection with WCPSD1, it is recommended that Pine Grove install an on-site backup generator at the water treatment facility and an early warning monitoring system on the raw water source. Additional detail of the selection of this alternative is discussed in the "Conclusion and Recommendations" section of this report. The feasibility study and supporting documentation is included in the Appendices.

<u>Backup Intake</u>

The closest substantially different water source to Pine Grove's treatment facility is the South Fork Fishing Creek. Stream flow data is not readily available for the South Fork Fishing Creek; however,

in discussion with Pine Grove personnel, it is strongly believed that the South Fork Fishing Creek has adequate supply to provide the average water demand of Pine Grove on an intermittent basis. The South Fork Fishing Creek could have difficulties supplying the full demand of Pine Grove on a permanent basis. The capacity of the treatment facility is 130 gallons per minute; therefore, that is the minimum flow required of the secondary water source.

The backup intake would be located approximately 7,300 feet upstream of the confluence of the North Fork Fishing Creek and the South Fork Fishing Creek. The intake will require approximately 9,700 feet of 6" raw water line and an intake pumping system.

Interconnection

Pine Grove is currently interconnected with Wetzel County Public Service District #1 (WCPSD1) which purchases water from the City of New Martinsville (New Martinsville). New Martinsville obtains raw water from ground wells.

After analysis of New Martinsville's maximum water draw capacity and the average demands of all systems, it was concluded that New Martinsville is currently capable of supplying the average water demand to Pine Grove, through the WCPSD1 system.

New Martinsville has water draw capacity available to supply the full demand of Pine Grove. However, due to the existing configuration of the interconnection between WCPSD1 and Pine Grove, upgrades are required to achieve the necessary flows between WCPSD1 and Pine Grove to supply the full demand of Pine Grove.

The interconnection with New Martinsville, by way of WCPSD1, was analyzed in the feasibility analysis.

Treated Water Storage

Pine Grove currently has 250,000 gallons of treated water storage available. To satisfy the two (2) day minimum required storage capacity as stated in Senate Bill 373, Pine Grove needs 288,000 gallons of storage. To satisfy the five (5) day maximum required storage capacity as stated in WV BPH regulations, Pine Grove needs 357,500 gallons of storage.

Pine Grove does not currently meet the required minimum or maximum treated water storage capacities. The required minimum and maximum additional water storage is 38,000 gallons and 107,500 gallons, respectively. The construction of a 105,000 gallon treated water storage tank was considered in the feasibility analysis.

Raw Water Storage

Pine Grove currently has one (1) raw water storage tank with a capacity of 177,000 gallons. Due to the capabilities of the raw water intake pumps, only approximately 70% of the raw water tank is available for use. As previously mentioned, to satisfy the minimum required storage capacity Pine Grove needs 288,000 gallons of storage. The additional raw water storage necessary to meet the minimum requirement is 111,000 gallons. This alternative also considered upgrading the raw water

intake pumps. The construction of a 139,000 gallon raw water storage tank was considered in the feasibility analysis.

This SWPCP describes in detail the aforementioned aspects of Pine Grove's public water system, analyzes alternatives for sources of water supply, and compares alternatives in a feasibility matrix to determine the most suitable and feasible alternative for Pine Grove. The recommendations for Pine Grove are as follows: improvement of the existing interconnection allowing WCPSD1 to supply the full demand of Pine Grove, installation of an on-site backup generator at the water treatment facility to allow normal operation during power outages, and installation of an early warning monitoring system on the primary raw water source to detect and warn system operators of contamination. Further detail of the selection of this alternative is provided in the "Conclusion and Recommendation" section of this report.

PURPOSE

The goal of the West Virginia Bureau for Public Health (WV BPH) source water assessment and protection (SWAP) program is to prevent degradation of source waters which may preclude present and future uses of drinking water supplies to provide safe water in sufficient quantity to users. The most efficient way to accomplish this goal is to encourage and oversee source water protection on a local level. Every aspect of source water protection is best addressed by engaging local stakeholders.

The intent of this document is to describe what Pine Grove has done, is currently doing, and plans to do to protect its source of drinking water. Although this water system treats the water to meet federal and state drinking water standards, conventional treatment does not fully eradicate all potential contaminants, and treatment that goes beyond conventional methods is often very expensive. By completing this plan, Pine Grove acknowledges that implementing measures to prevent contamination can be a relatively economical way to help ensure the safety of the drinking water.

What are the benefits of preparing a Source Water Protection Plan?

- Fulfills the requirement for the public water utilities to complete or update their source water protection plan.
- Identifies and prioritizes potential threats to the source of drinking water; and establishes strategies to minimize the threats.
- Plans for emergency responses to incidents that compromise the water supply by contamination or depletion, including how the public, state, and local agencies will be informed.
- Plans for future expansion and development, including establishing secondary sources of water.
- Ensures conditions to provide the safest and highest quality drinking water to customers at the lowest possible cost.
- Provides more opportunities for funding to improve infrastructure, purchase land in the protection area, and other improvements to the intake or source water protection areas.

BACKGROUND: WV SOURCE WATER ASSESSMENT AND PROTECTION PROGRAM

Since 1974, the federal Safe Drinking Water Act (SDWA) has set minimum standards on the construction, operation, and quality of water provided by public water systems. In 1986, Congress amended the SDWA. A portion of those amendments was designed to protect the source water contribution areas around groundwater supply wells. This program eventually became known as the Wellhead Protection Program (WHPP). The purpose of the WHPP is to prevent pollution of the source water supplying the wells.

The Safe Drinking Water Act Amendments of 1996 expanded the concept of wellhead protection to include surface water sources under the umbrella term of “Source Water Protection”. The amendments encourage states to establish SWAP programs to protect all public drinking water supplies. As part of this initiative, states must explain how protection areas for each public water

system will be delineated, how potential contaminant sources will be inventoried, and how susceptibility ratings will be established.

In 1999, the WVBPH published the West Virginia Source Water Assessment and Protection Program, which was endorsed by the United States Environmental Protection Agency. Over the next few years, WVBPH staff completed an assessment (i.e., delineation, inventory and susceptibility analysis) for all of West Virginia's public water systems. Each public water system was sent a copy of its assessment report. Information regarding assessment reports for Pine Grove can be found in **Table 1**.

STATE REGULATORY REQUIREMENTS

On June 6, 2014, §16.1.2 and §16.1.9a of the Code of West Virginia (1931) was reenacted and amended by adding three new sections designated §16.1.9c, §16.1.9d and §16.1.9e. The changes to the code outline specific requirements for public water utilities that draw water from a surface water source or a groundwater source influenced by surface water (GUIDI).

Under the amended and new codes, each existing public water utility using surface water or ground water influenced by surface water as a source must have completed or updated a source water protection plan by July 1, 2016, and must continue to update their plan every three years. Existing source water protection plans have been developed for many public water utilities in the past. If available, these plans were reviewed and considered in the development of this updated contingency plan. Any new water system established after July 1, 2016 must submit a source water protection plan before they begin operation. A new plan is also required when there is a significant change in the potential sources of significant contamination (PSSC) within the zone of critical concern (ZCC).

The code also requires that public water utilities include details regarding PSSCs, protection measures, system capacities, contingency plans, and communication plans. Before a plan can be approved, the local health department and public will be invited to contribute information for consideration. In some instances, public water utilities may be asked to conduct independent studies of the source water protection area and specific threats to gain additional information.

SYSTEM INFORMATION

Pine Grove is classified as a state regulated public utility and operates a public water system serving the area of Pine Grove, West Virginia. A public water system is defined as "any water supply or system which regularly supplies or offers to supply water for human consumption through pipes or other constructed conveyance, if serving at least an average of twenty-five individuals per day for at least sixty days per year, or which has at least fifteen service connections, and shall include i) any collection, treatment, storage and distribution facilities under the control of the owner or operator of the system and used primarily in connection with the system; and ii) any collection or pretreatment storage facilities not under such control which are used primarily in connection with the system." A public water utility is defined as "a public water system which is regulated by the West Virginia Public Service Commission." For purposes of this Plan, public water systems are also referred to as public water utilities. Information on the population served by this utility is presented in **Table 1**.

Table 1 – Population Served by Pine Grove Municipal Water Works

Administrative office location:			992 North Fork Road Pine Grove, WV 26419	
Is the system a public utility, according to the Public Service Commission rule?			Public Utility Municipality	
Date of Most Recent Source Water Assessment Report:			March 2003 By Bureau for Public Health	
Date of Most Recent Source Water Protection Plan:			September 2010	
Customers served directly:			271 Residential 31 Commercial; 2 Industrial 3 Public Authorities **307 Total Customers**	
Bulk Water Purchaser Systems:	**System Name**	**PWSID Number**	**Customers Served**	**Population**
	N/A	N/A	N/A	N/A
Total Population Served by the Utility:			**593**	
Does the utility have multiple source water protection areas (SWPAs)?			No	
How many SWPAs does the utility have?			1	

WATER TREATMENT AND STORAGE

As required, Pine Grove has assessed their system (e.g., treatment capacity, storage capacity, unaccounted for water, contingency plans) to evaluate their ability to provide drinking water and protect public health.

Table 2 contains information on the water treatment methods and capacity of the utility. Information about the surface water sources from which Pine Grove draws water can be found in **Table 3**. If the utility draws water from any groundwater sources to blend with the surface water, the information about these ground water sources can be found in **Table 4**.

Table 2 – Pine Grove Municipal Water Works Water Treatment Information

Water Treatment Process (List in order)	Raw Water Intake ↓ Intake Pumps ↓ Raw Water Tank ↓ Flocculation ↓ Filtration ↓ Chlorination/Clearwell ↓ High Service Pumps ↓ Distribution System
Current Treatment Capacity (gal/day)	192,000
Current Average Production (gal/day)	71,475
Maximum Quantity Treated and Produced (gal)	144,000
Minimum Quantity Treated and Produced (gal)	23,000
Average Hours of Operation	8
Maximum Hours of Operation in One Day	16
Minimum Hours of Operation in One Day	3
Number of Storage Tanks Maintained	2
Total Gallons of Treated Water Storage (gal)	250,000
Total Gallons of Raw Water Storage (gal)	177,000 – 70% available for use due to capabilities of raw water intake pumps

Table 3 – Pine Grove Municipal Water Works Surface Water Sources

Intake Name	SDWIS #	Local Name	Describe Intake	Name of Water Source	Date Constructed/ Modified	Frequency of Use (Primary/ Backup/ Emergency)	Activity Status (Active/ Inactive)
Pine Grove			12” T-Shaped Intake, gravity flows to wet-well, pumped to raw water tank/treatment plant	North Fork Fishing Creek	last modified in 2002	Primary	Active

Table 4 – Pine Grove Municipal Water Works Groundwater Sources

Does the utility blend with groundwater?	No

(C) – Constructed
(M) - Modified

Response Networks and Communication

Statewide initiatives for emergency response, including source water related incidents, are being developed. These include the West Virginia Water/Wastewater Agency Response Network (WV WARN, (see http://www.wvwarn.org/) and the Rural Water Association Emergency Response Team (see http://www.wvrwa.org/). Pine Grove has analyzed its ability to effectively respond to emergencies and this information is provided in **Table 5**.

Table 5 – Pine Grove Municipal Water Works Water Shortage Response Capability

Can the utility isolate or divert contamination from the intake or groundwater supply?	No
Describe the utility's capability to isolate or divert potential contaminants:	N/A
Can the utility switch to an alternative water source or intake that can supply full capacity at any time?	No; however, there is an existing interconnection with WCPSD1 available intermittently
Describe in detail the utility's capability to switch to an alternative source:	N/A; however, opening the valve at the interconnection will allow WCPSD1 to intermittently supply Pine Grove's average water demand
Can the utility close the water intake to prevent contamination from entering the water treatment facility?	Yes
How long can the intake stay closed?	Approximately 4 days
Describe the process to close the intake:	Shut down intake pumps; close valve on intake line
Describe the treated water storage capacity of the water system:	Two (2) water storage tanks totaling 250,000 gallons. At the time of this report, Pine Grove was operating at 75% treated water storage capacity.
Is the utility a member of WVRWA Emergency Response Team?	No
Is the utility a member of WV-WARN?	No
List any other mutual aid agreements to provide or receive assistance in the event of an emergency:	N/A

It is suggested that, since the utility does not have the capability to divert contamination from the surface water intake, pre-cast concrete bases are constructed around the raw water intake to drop booms into the water and physically divert surface contaminants from entering the raw water intake.

Operation during Loss of Power

This utility analyzed and examined its ability to operate effectively during a loss of power. This involved ensuring a means to supply water through treatment, storage, and distribution without creating a public health emergency. Information regarding the utility's capacity for operation during power outages is shown in **Table 6** on the following page. The utility's standby capacity would have the capability to provide power to the system as if normal power conditions existed. The utility's emergency capacity would have the capability to provide power to only the essential equipment and treatment processes needed to provide water to the system. Information regarding the emergency generator capacity for each utility was provided by the WV BPH.

Table 6 – Pine Grove Municipal Water Works Generator Capacity

What is the type and capacity of the generator needed to operate during a loss of power?	The emergency generator capacity for the treatment facility is 48 kW and the standby capacity is estimated to be 60 kW. There is no need for a generator within the distribution system.			
Can the utility connect to generator at intake/wellhead? If yes, select a scenario that best describes system.	N/A; the intake is located at the water treatment plant			
Can the utility connect to generator at treatment facility? If yes, select a scenario that best describes system.	Yes; a generator can be wired into the electrical controls of the treatment plant.			
Can the utility connect to a generator in distribution system? If yes, select a scenario that best describes system.	N/A. There are no booster pump stations within the distribution system			
Does the utility have adequate fuel on hand for the generator?	N/A. Pine Grove does not currently own a generator			
Provide a list of suppliers that could provide generators and fuel in the event of an emergency:	**Supplier**		**Contact Name**	**Phone Number**
	Generator	Generac		1-888-905-5724
	Generator	GE Generator Systems		1-877-898-5510
	Fuel	Tom's One Stop		304-386-4813
	Fuel	Mason's Filling Station		304-386-4721
Does the utility test the generator(s) periodically?	N/A			
Does the utility routinely maintain the generator?	N/A			
If no scenario describing the ability to connect to generator matches the utility's system or if utility does not have ability to connect to a generator, describe plans to respond to power outages:	Coordinate with local Emergency Services to obtain a generator			

If a portable generator is available through the respective county's 911 or Emergency Center, it is assumed the generator is available **only** for the utility for which this Source Water Protection Contingency Plan is prepared. If more than one utility in the county uses the portable generator

during power outages, it is suggested that each utility procure a generator specifically to protect their system during a power outage.

Future Water Supply Needs

When planning for potential emergencies and developing contingency plans, a utility needs to not only consider their current demands for treated water but also account for likely future needs. This could mean expanding current intake sources or developing new ones in the near future. This can be an expensive and time consuming process, and any water utility should take this into account when determining emergency preparedness. Pine Grove has analyzed its ability to meet future water demands at current capacity and this information is included in **Table 7**.

Table 7 – Future Water Supply Needs for Pine Grove Municipal Water Works

Is the utility able to meet water demands with the current production capacity over the next 5 years? If so, explain how you plan to do so.	Yes; there is little to no increase expected in the customer demand within the next five (5) years for Pine Grove. If any increase is experienced, it is expected to be minimal and the plant is expected to remain under the maximum treatment capacity. If a significant increase is experienced, the treatment plant would need to be upgraded at that time.
If not, describe the circumstances and plans to increase production capacity:	N/A

Water Loss Calculation

In any public water system, there is a certain percentage of the total treated water that does not reach the customer distribution system. Some of this water is used in treatment plant processes such as backwashing filters or flushing piping, but there is usually at least a small percentage unaccounted. To measure and report on this unaccounted for water, a public utility must use the same method used in the Public Service Commission's rule, *Rules for the Government of Water Utilities*, 150CSR7, Section 5.6. The rule defines unaccounted for water as "the volume of water introduced into the distribution system less all metered usage and all known non-metered usage which can be estimated with reasonable accuracy."

To further clarify, metered usages are most often those that are distributed to customers. Non-metered usages estimated include water used by fire departments for fires or training, un-metered bulk sales, flushing to maintain the distribution system, backwashing filters, and cleaning settling basins. By totaling the metered and non-metered uses, the utility calculates unaccounted for water. Note: To complete annual reports submitted to the PSC, utilities typically account for known water main breaks by estimating the amount of water lost. However, for the purposes of the source water protection plan, any water lost due to leaks – even if the system is aware of how

much water is lost at a main break – is not considered a use. Water lost through leaks and main breaks cannot be controlled during water shortages or other emergencies and should be included in the calculation of percentage of water loss for purposes of the source water protection plan. The data in **Table 8** is taken from the most recently submitted Pine Grove PSC Annual Report.

Table 8 – Water Loss Information for Pine Grove Municipal Water Works

Total Water Pumped (gal)		21,545,000
Total Water Purchased (gal)		0
Total Water Pumped and Purchased (gal)		21,545,000
Water Loss Accounted for Except Main Leaks (gal)	**Mains, Plants, Filters, Flushing, etc.**	0
	Fire Department	0
	Back Washing	0
	Blowing Settling Basins	0
Total Accounted For Water Loss		0
Water Sold- Total Gallons (gal)		16,255,000
Unaccounted For Lost Water (gal)		5,290,000
Water lost from main leaks (gal)		0
Total Percent Unaccounted For Water Loss (%)		**24.55%**
If total percentage of Unaccounted for Water is greater than 15%, please describe any measures that could be taken to correct this problem:		Continue to conduct leak detection and make necessary repairs

Early Warning Monitoring System

Public water utilities are required to provide an examination of the technical and economic feasibility of implementing an early warning monitoring system. Implementing an early warning monitoring system may be approached in different ways depending on the utility's resources and threats to the source water. A utility may install a continuous monitoring system that will provide real-time information regarding water quality conditions. This would require utilities to analyze the data in order to establish what condition(s) is(are) indicative of a contamination

event. Continuous monitoring will provide results for a predetermined set of parameters. The more parameters being monitored, the more sophisticated the monitoring equipment will be. When establishing a continuous monitoring system, the utility should consider the logistics of placing and maintaining the equipment and receiving output data from the equipment.

Alternately, or in addition, a utility may also pull periodic grab samples on a regular basis or in case of a reported incident. The grab samples may be analyzed for specific contaminants. A utility should examine their PSSCs to determine what chemical contaminants could pose a threat to the water source. If possible, the utility should plan in advance how those contaminants will be detected. Consideration should be given for where samples will be collected, the preservations and hold times for samples, available laboratories to analyze samples, and costs associated with the sampling event. Regardless of the type of monitoring (continuous or grab), utilities should collect samples for their source throughout the year to better understand the baseline water quality conditions and natural seasonal fluctuations. Having a baseline will help determine if changes in the water quality are indicative of a contamination event and inform the needed response.

Every utility should establish a system or process for receiving or detecting chemical threats with sufficient time to respond to protect the treatment facility and public health. All approaches to receiving and responding to an early warning should incorporate communication with facility owners and operators that pose a threat to the water quality, state and local emergency response agencies, surrounding water utilities, and the public. Communication plays an important role in knowing how to interpret data and how to respond.

Pine Grove has analyzed its ability to monitor for and detect potential contaminants that could impact its source water. Information regarding this utility's early warning monitoring system capabilities can be found in **Table 9** and in **Appendix A**.

Table 9 – Early Warning Monitoring System Capabilities for Pine Grove Municipal Water Works

<table>
<tr><td colspan="2">Does your system currently receive spill notifications from a state agency, neighboring water system, local emergency responders, or other facilities? If yes, from whom do you receive notices?</td><td colspan="2">The utility receives spill notifications from the WV Health Department.</td></tr>
<tr><td colspan="2">Are you aware of any facilities, land uses, or critical areas within your protection areas where chemical contaminants could be released or spilled?</td><td colspan="2">No</td></tr>
<tr><td colspan="2">Are you prepared to detect potential contaminants if notified of a spill?</td><td colspan="2">Yes; the utility collects grab sample and tests for contaminant(s)</td></tr>
<tr><td rowspan="3">List laboratories (and contact information) on which you would rely to analyze water samples in case of a reported spill.</td><td colspan="2">Laboratories</td></tr>
<tr><td>Name</td><td>Contact</td></tr>
<tr><td>REI Consultants</td><td>(304) 255-2500</td></tr>
<tr><td colspan="2">WV Office of Lab Services</td><td>(304) 558-3530</td></tr>
<tr><td colspan="2">Do you have an understanding of baseline or normal conditions for your source water quality that accounts for seasonal fluctuations?</td><td colspan="2">Yes</td></tr>
<tr><td colspan="2">Does your utility currently monitor raw water (through continuous monitoring or periodic grab samples) at the surface water intake or from a groundwater source on a regular basis?</td><td colspan="2">Yes; periodic grab samples</td></tr>
<tr><td rowspan="2" colspan="2">Provide or estimate the capital and O&M costs for your current or proposed early warning system or upgraded system.</td><td>Capital</td><td>$50,000</td></tr>
<tr><td>Yearly O&M</td><td>$750</td></tr>
<tr><td colspan="2">Do you serve more than 100,000 customers? If so, please describe the methods you use to monitor at the same technical levels utilized by ORSANCO.</td><td colspan="2">No</td></tr>
</table>

SINGLE SOURCE FEASIBILITY STUDY

If a public water utility's water supply plant is served by a single-source intake to a surface water source of supply, or a surface water influenced ground water source of supply, the submitted source water protection plan must also include an examination and analysis of the technical and economic feasibility of alternative sources of water to provide continued safe and reliable public water service in the event its primary source of supply is detrimentally affected by contamination, release, spill event or other reason. These alternatives may include a secondary intake, two days of raw or treated water storage, interconnections with neighboring systems, or other options identified on a local level. Note: a secondary intake would draw water supply from a substantially different location or water source.

In order to accomplish this requirement, utilities should examine all existing or possible alternatives and rank them by their technical, economic, and environmental feasibility. In order to have a consistent method for ranking alternatives, WV BPH has developed a feasibility study guide. This guide provides several criteria to consider for each category, organized in a scoring matrix. By completing the Feasibility Study, utilities will demonstrate the process used to examine the feasibility of each alternative. The Feasibility Study matrix is included as **Appendix B**. Those alternatives that are ranked highest and deemed to be most feasible will then be the subject of a second, more in-depth, study to analyze the comparative costs, risks, and benefits of implementing each of the described alternatives. An alternatives analysis report providing these details is attached as **Appendix C**.

CONCLUSION & RECOMMENDATION

This Source Water Protection Contingency Plan is intended to help prepare community public water systems all over West Virginia to properly handle any emergencies that might compromise the quality of the system's source of water supply. It is imperative that this plan be updated as often as necessary to reflect the changing circumstances within the water system. The protection team should continue to meet regularly and continue to engage the public whenever possible.

Communities taking local responsibility for the quality of their source of water supply is the most effective way to prevent contamination and protect a water system against contamination. Community cooperation, sufficient preparation, and accurate monitoring are all critical components of the source water protection plan. A multi-faceted approach is the only way to ensure that a system is reasonably protected against source water degradation.

This report represents a detailed explanation of the required elements of Pine Grove's Source Water Protection Contingency Plan. This plan includes the evaluation of four (4) alternatives for maintaining water service in the event Pine Grove's primary source of water supply becomes contaminated. Supporting documentation and any other materials the utility considers relevant to this plan can be found in **Appendix D**.

As shown in the Feasibility Matrix in **Appendix B**, the alternative with the highest final score of feasibility is the improvement of the existing interconnection with WCPSD1. It is also recommended that Pine Grove install an on-site backup generator at the water treatment facility and an early warning monitoring system at the raw water intake. Improving the interconnection with WCPSD1 will require the replacement of approximately 2,000 feet of existing 4" water line with new 6" water line to ensure an adequate flow rate into Pine Grove, as well as coordination and consistent communication between Pine Grove, WCPSD1, and New Martinsville to ensure essential treated water demands are achieved for all systems.

Through the implementation of these recommendations, Pine Grove will have a feasible source of treated water in the event the primary raw water source becomes contaminated, will be able to continue treating water in the event of a power outage, and will be able to gather and analyze real-time information regarding water quality conditions of the raw water source.

A cost estimate for the recommendations is provided below. Further explanations of the costs are provided in **Appendix D**.

ESTIMATED COSTS OF RECOMMENDATIONS

Description	Cost
On-Site Backup Generator	$35,000
Early Warning Monitoring System	$50,000
Improvement of Interconnection	$105,000
Total	**$ 180,000**

APPENDIX A – EARLY WARNING MONITORING SYSTEM

Appendix A

Proposed Early Warning Monitoring System

Describe the type of early warning detection equipment that could be installed, including the design.
The early warning detection equipment that could be installed includes a level controller, display module, back panel, level & trough (see cost estimate by Hach Company in Appendix D) along with conductivity, oil-in-water, ORP, and pH sensors.
Where would the equipment be located?
The early warning monitoring system would be located upstream of the raw water intake on North Fork Fishing Creek
What would the maintenance plan for the monitoring equipment entail?
The proposed maintenance plan for the monitoring equipment shall consist of annual cleaning and/or exchanging of the probe(s) for the controller. Periodic calibration of the unit may also be required.
Describe the proposed sampling plan at the monitoring site.
Sampling of water quality data occurs every fifteen (15) minutes. Pine Grove would need to retrieve data from the "History" of the controller data collector twice per month.
Describe the proposed procedures for data management and analysis.
Data management for the early warning monitoring system consists of data points (up to 500 points or approximately six months per probe) being recorded in the "History" of the controller data collector. To access the "History", the probe has to be plugged into the controller. Data is able to be removed via USB or through a local SCADA system.

Literature related to the development and design of early warning systems is provided on the following pages. Courtesy of the American Water Works Association.

APPENDIX B – FEASIBILITY STUDY MATRIX

Matrix Explanation

The alternative analysis matrix evaluates the utility's ability to implement each of the additional sources outlined. Alternative sources are evaluated for economic, technical, and environmental feasibility. The matrix uses a zero (0) to three (3) rating system, with three (3) being very feasible and zero (0) being not feasible. Each category has sub questions to develop an average for the alternative. Once all areas are evaluated, a final feasibility score is given for each of the alternatives for use in determining which option will best suit the utility's needs.

Economic factors evaluated in the matrix include all information needed to fund the alternative. The matrix considers the current utility budget available per the latest annual report, operation and maintenance costs for each alternative, and the capital cost needed to construct each alternative. Supporting documentation is included in **Appendix D** of the report, which provides a breakdown of costs for each alternative that are used as capital costs in the matrix. The economic feasibility of each alternative is compared on a cost per gallon ratio. This ratio is determined by dividing the capital cost of the improvements by the total number of gallons of water produced per year. An average of the economic feasibility factors is then calculated and entered into the overall feasibility matrix found in **Appendix B**.

Technical criteria evaluated include permitting, flexibility, institutional and resilience factors. Permitting costs are included in all supporting documentation for each alternative source. The permitting factors included the permits that would be needed to construct the alternative source for the utility. An additional environmental factor is the feasibly of obtaining each permit. Permits were rated from zero (0) to three (3) based on the difficulty of obtaining the permits for the project. Depending on the project area, some permits may be very difficult and costly to obtain. Flexibility factors evaluate the ability of the alternative to be used as a permanent source of water or if it can only be used on a temporary basis.. The intake and interconnections can be used as both temporary and permanent sources. The alternatives' ability to help the utility during seasonal or population increases is also evaluated in the resilience factors. The alternatives that can produce additional water were rated as very feasible (3). Additional criteria evaluated are easements and rights-of-ways that will need to be acquired to construct the alternative source. For interconnections and intakes rights-of-ways would be needed to lay the new water line. The feasibility of obtaining the rights-of-ways was evaluated. All technical criteria was averaged and entered into the feasibility summary in **Appendix B**.

Environmental aspects for each alternative include impacts, aesthetics and stakeholders. Environmental impacts included any areas in the proposed alternative source area that are protected. Areas that are protected would have a low feasibility because the impacts could be

large if the project were constructed. Aesthetics factors include noise, visual impacts, and mitigation measures that could affect the project's feasibility. The aesthetic factors relate to the stakeholder factors. The stakeholders' portion of the environmental criteria involves the community and their acceptance of the new source alternative and the structures that will be constructed.

Feasibility Matrix | **Pine Grove Municipal Water Works** | **PWSID#: WV 3305205** | **Date: January 2016** | **Completed By: The Thrasher Group, Inc.**

Alternative Strategy Description	Economic Criteria						Technical Criteria							Environmental Criteria						Final Score	Total Capital Cost	Comments
	Operation & Maintenance Costs	Capital Costs	Total	Total %	Weighted Total	Permitting	Flexibility	Resilience	Institutional Requirements	Total	Total %	Weighted Total	Environmental Impacts	Aesthetic Impacts	Stakeholder Issues	Total	Total %	Weighted Total			
Backup Intake	2.7	2.7	**5.3**	**88.9%**	**35.6%**	2.8	2.0	2.7	2.7	**10.1**	**84.4%**	**33.8%**	2.0	3.0	3.0	**8.0**	**88.9%**	**17.8%**	**87.1%**	**$800,000.00**	Intermittent backup to the primary water source; upgrades to treatment plant or changes in operation may be required.
Interconnect	3.0	3.0	**6.0**	**100.0%**	**40.0%**	3.0	3.0	2.7	3.0	**11.7**	**97.2%**	**38.9%**	3.0	3.0	3.0	**9.0**	**100.0%**	**20.0%**	**98.9%**	**$105,000.00**	Interconnection already exists. Need to replace section of water main with larger size pipe.
Treated Water Storage	3.0	2.8	**5.8**	**97.2%**	**38.9%**	3.0	3.0	2.7	2.7	**11.3**	**94.4%**	**37.8%**	3.0	3.0	3.0	**9.0**	**100.0%**	**20.0%**	**96.7%**	**$403,625.00**	Adding treated water storage tank will meeting SB373 requirements. Additional tank will require land purchase.
Raw Water Storage	3.0	2.7	**5.7**	**94.4%**	**37.8%**	3.0	3.0	2.7	2.7	**11.3**	**94.4%**	**37.8%**	3.0	3.0	3.0	**9.0**	**100.0%**	**20.0%**	**95.6%**	**$478,750.00**	Adding raw water storage will meet SB373 requirements. Additional tank will require land purchase. Mixing equipment is recommended to inhibit anoxic conditions.

Scoring:

0 - Not feasible. Criterion cannot be met by this alternative and removes the alternative from further consideration.

1 - Feasible but difficult. Criterion represents a significant barrier to successful implementation but does not eliminate it from consideration.

2 - Feasible. Criterion can be met by the alternative.

3 - Very Feasible. Criterion can be easily met by the alternative.

APPENDIX C – ALTERNATIVES ANALYSIS

ANALYSIS OF ALTERNATIVES

Pine Grove currently has no alternative source of raw water that can be utilized in the event the primary water source becomes contaminated. However, Pine Grove has an existing interconnection with Wetzel County PSD #1 that can intermittently supply Pine Grove's average water demand. WCPSD1 purchases treated water from the City of New Martinsville. By upgrading the interconnection, the full demand of Pine Grove can be supplied by New Martinsville by way of WCPSD1.

1. **Backup Intake**

   Pine Grove's surface water intake located on the North Fork Fishing Creek is currently the only source of water supply for the utility. The neighboring South Fork Fishing Creek is the closest substantially different water source that could intermittently supply Pine Grove's average water demand.

   Stream flow data of the South Fork Fishing Creek is not reported by the WV Flood Tool, USGS database, or WV DEP database. However, through discussion with Pine Grove personnel, it is strongly believed that the South Fork Fishing Creek can supply the average demand of Pine Grove. The capacity of Pine Grove's treatment facility is 130 gallons per minute; therefore, this is the minimum required flow of the South Fork Fishing Creek.

   The proposed backup intake would be located approximately 7,300 feet upstream of the confluence of the North Fork Fishing Creek and the South Fork Fishing Creek and will require approximately 9,300 feet of water line and an intake pumping system. This alternative was considered in the feasibility analysis. A cost analysis is provided in **Appendix D**.

2. **Interconnection**

   Pine Grove is currently interconnected with Wetzel County PSD #1 which purchases treated water from the City of New Martinsville. New Martinsville draws water from groundwater wells for distribution to its customers.

   The interconnection between WCPSD1 and New Martinsville can supply the full demand of both WCPSD1 and Pine Grove, but the interconnection between WCPSD1 and Pine Grove can only intermittently supply the average demand of Pine Grove due to the configuration of the interconnection piping.

   The interconnection between Pine Grove and WCPSD1 consists of a 6" line from WCPSD1 connected to a 4" line in Pine Grove. Approximately 2,000 feet of 4" water line needs to be replaced with a 6" line to supply the full demand of Pine Grove.

On average, New Martinsville draws 1,183,000 gallons per day (GPD) from its groundwater wells and Pine Grove produces 71,500 GPD. Therefore, the total water that would need to be drawn from the wells by New Martinsville is calculated to be:

$$1{,}183{,}000 \text{ GPD} + 71{,}500 \text{ GPD} = 1{,}254{,}500 \text{ GPD}$$

The total water demand of 1,254,500 gallons per day is below the draw capacity of 2,880,000 gallons per day. Therefore, New Martinsville would be fully capable of providing treated water to Pine Grove, by way of WCPSD1, in the event that Pine Grove would be fully reliant on New Martinsville for water supply.

Thus, an interconnection with New Martinsville by way of WCPSD1 was considered in the feasibility analysis. A cost analysis is provided in **Appendix D**.

3. Treated Water Storage

Pine Grove's treated water storage capacity for the system consists of two (2) water storage tanks totaling 250,000 gallons. On average, the water treatment facility produces approximately 71,500 gallons per day of water. The maximum produced by the water treatment facility from September 2014 to October 2015 was 144,000 gallons per day, according to monthly operating reports provided by the utility.

The minimum required treated storage capacity, according to Senate Bill 373, is equal to two (2) days of system storage based on the plant's maximum level of production experienced within the past year, and the maximum required is equal to five (5) days of the average production, according to WV BPH standards requiring 20% turnover per day.

The minimum required treated water storage capacity for the system would be:

$$144{,}000 \text{ gallons per day} * 2 \text{ days} = 288{,}000 \text{ gallons}$$

The maximum required treated water storage capacity for the system would be:

$$71{,}500 \text{ gallons per day} * 5 \text{ days} = 357{,}500 \text{ gallons}$$

Therefore, the system currently does not meet the minimum or maximum required treated water storage capacity. The additional required treated water storage to meet the minimum and maximum requirements, respectively, is calculated to be:

$$288{,}000 \text{ gallons} - 250{,}000 \text{ gallons} = 38{,}000 \text{ gallons}$$

$$357{,}500 \text{ gallons} - 250{,}000 \text{ gallons} = 107{,}500 \text{ gallons}$$

Thus, the construction of a 105,000 gallon treated water storage tank was considered in the feasibility analysis. A cost analysis is provided in **Appendix D**.

4. Raw Water Storage

Pine Grove's raw water storage capacity for the system consists of one (1) tank totaling 177,000 gallons. Due to the capabilities of the raw water intake pumps, approximately 70% of the raw water storage tank is available for use.

As mentioned in Section #3, the water treatment facility produces 71,500 gallons per day on average and has a maximum production of 144,000 gallons per day. The minimum required raw water storage capacity for the system would be 288,000 gallons.

Therefore, the system currently does not meet the minimum required raw water storage capacity. The remaining minimum required raw water storage capacity for the system would be:

$$288{,}000 \text{ gallons} - 177{,}000 \text{ gallons} = 111{,}000 \text{ gallons}$$

Thus, the construction of a 139,000 gallon raw water storage tank and upgrading the raw water intake pumps was considered in the feasibility analysis. A cost analysis is provided in **Appendix D**.

Alternatives Analysis | **Pine Grove Municipal Water Works** | **PWSID#: WV 3305205** | **Date: January 2016** | **Completed By: The Thrasher Group, Inc.**

Criteria	Question	Backup Intake	Feasibility	Interconnect	Feasibility	Treated Water Storage	Feasibility	Raw Water Storage	Feasibility
Economic Criteria									
What is the total current budget year cost to operate and maintain the PWSU (current budget year)?		$110,533.00		$110,533.00		$110,533.00		$110,533.00	
O and M Costs	Describe the major O&M cost requirements for the alternative?	Power, materials for maintenance	2	Materials for maintenance	3	Materials for maintenance	3	Materials for maintenance	3
	What is the incremental cost ($/gal) to operate and maintain the alternative?	$0.01	3	$0.01	3	$0.01	3	$0.01	3
	Cost comparison of the incremental O&M cost to the current budgeted costs (%)	0.00%	3	0.00%	3	0.00%	3	0.00%	3
O and M-Feasibility Score			***2.7***		***3.0***		***3.0***		***3.0***
Describe the capital improvements required to implement the alternative.		Construction of Intake Pumping Station and Water Transmission Line		Replacement of Water Main Line		Construction of Treated Water Storage Tank (38,000 gal)		Construction of Raw Water Storage Tank (111,000 gal)	
Capital Costs	What is the total capital cost for the alternative?	$800,000.00	2	$105,000.00	3	$403,625.00	3	$478,750.00	2
	What is the annualized capital cost to implement the alternative, including land and easement costs, convenience tap fees, etc. ($/gal)	$0.04	3	$0.00	3	$0.02	3	$0.02	3
	Cost comparison of the alternatives annualized capital cost to the current budgeted costs (%)	0.00%	3	0.00%	3	0.00%	3	0.00%	3
Capital Cost-Feasibility Score			***2.7***		***3.0***		***2.8***		***2.7***
Technical Criteria									
Permitting	Provide a listing of the expected permits required and the permitting agencies involved in their approval.	WVDEP, ACOE, WVDOH, WVBPH, County Floodplain, WVDNR, WVSHPO, and USFWS	3	WVDNR, WVSHPO, USFWS, WVDEP, WVBPH, and WVDOH	3	None	3	WVDNR, WVSHPO, USFWS, WVDEP, WVBPH, and WVDOH	3
	What is the timeframe for permit approval for each permit?	WVDEP, ACOE, WVDOH, WVBPH, County Floodplain (90 days) WVDNR, WVSHPO, USFWS (60 days)	2	WVDNR, WVSHPO, USFWS (60 days) WVDEP, WVDOH, WVBPH (90 days)	3	WVDNR, WVSHPO, USFWS (60 days) WVDEP, WVDOH, WVBPH (90 days)	3	WVDNR, WVSHPO, USFWS (60 days) WVDEP, WVDOH, WVBPH (90 days)	3
	Describe the major requirements in obtaining the permits (environmental impact studies, public hearings, etc.)	Environmental impact studies.	3	Environmental impact studies.	3	N/A	3	Environmental impact studies.	3
	What is the likelihood of successfully obtaining the permits?	Good	3	Good	3	N/A	3	Good	3
	Does the implementation of the alternative require regulatory exceptions or variances?	No	3	No	3	No	3	No	3
Permitting-Feasibility Score			***2.8***		***3.0***		***3.0***		***3.0***
Flexibility	Will the alternative be needed on a regular basis or only used intermittently?	Needed and used only intermittently	2	Needed intermittently, but can be used permanently	3	Permanently	3	Needed intermittently, will be used permanently	3
	How will implementing the alternative affect the PWSU's current method of treating and delivering potable water including meeting Safe Drinking Water Act regulations? (ex. In the case of storage, will the alternative increase the likelihood of disinfection byproducts?)	Upgrades to Treatment Plant, or changes in operation, may be required	2	Current treatment methods will not be required	3	No impact	3	No impact	3
Flexibility-Feasibility Score			***2.0***		***3.0***		***3.0***		***3.0***
Resilience	Will the alternative provide any advantages or disadvantages to meeting seasonal changes in demand?	Yes	3	Yes	3	Yes	3	Yes	3
	How resistant will the alternative be to extreme weather conditions such as drought and flooding?	Drought may limit availability of water	2	Drought may limit availability of water	2	Drought may limit availability of water	2	Drought may limit availability of water	2
	Will the alternative be expandable to meet the growing needs of the service area?	Yes	3	Yes	3	Yes	3	Limited	2
Resilience-Feasibility Score			***2.7***		***2.7***		***2.7***		***2.7***
Institutional Requirements	Identify any agreements or other legal instruments with governmental entities, private institutions or other PWSU required to implement the alternative.	None	3	City of New Martinsville and Wetzel County PSD #1	3	None	3	None	3
	Are any development/planning restrictions in place that can act as a barrier to the implementation of the alternative.	No	3	No	3	No	3	No	3
	Identify potential land acquisitions and easements requirements.	Property acquisition for pump station	2	None	3	Property Acquisition for tank site	2	Property acquisition for tank site	2
Institutional Requirements-Feasibility Score			***2.7***		***3.0***		***2.7***		***2.7***
Environmental Criteria									
Environmental Impacts	Identify any environmentally protected areas or habitats that might be impacted by the alternative.	South Branch Fishing Creek	2	None	3	None	3	None	3
Environmental Impacts-Feasibility Score			***2.0***		***3.0***		***3.0***		***3.0***
Aesthetic Impacts	Identify any visual or noise issues caused by the alternative that may affect local land uses?	Temporary Impacts due to construction.	3	Temporary Impacts due to Construction.	3	None	3	Additional water tank at or near existing treatment facility	3
	Identify any mitigation measures that will be required to address aesthetic impacts?	Clearance from Culture and History and Local Zoning Commission	3	None	3	None	3	Clearance from Culture and History and Local Zoning Commission	3
Aesthetic Impacts-Feasibility Score			***3.0***		***3.0***		***3.0***		***3.0***
Stakeholder Issues	Identify the potential stakeholders affected by the alternative.	Water Customers	3	City of New Martinsville, Wetzel County PSD #1, Water Customers	3	None	3	Water Customers	3
	Identify the potential issues with stakeholders for and against the alternative.	Rate Increase may be needed to fund construction	3	Water purchase agreement with WCPSD #1, Rate increase to fund	3	None	3	Rate Increase to fund construction	3
	Will stakeholder concerns represent a significant barrier to implementation (or assistance) of the alternative?	No	3	No	3	No	3	No	3
Stakeholder Issues-Feasibility Score			***3.0***		***3.0***		***3.0***		***3.0***
Comments		Intermittent backup to the primary water source; upgrades to treatment plant or changes in operation may be required.		Interconnection already exists. Need to replace section of water main with larger size pipe.		Adding treated water storage tank will meeting SB373 requirements. Additional tank will require land purchase.		Adding raw water storage will meet SB373 requirements. Additional tank will require land purchase. Mixing equipment is recommended to inhibit anoxic conditions.	

APPENDIX D – SUPPORTING DOCUMENTATION

GENERATOR INFO
For
PINE GROVE MUNICIPAL WATER WORKS
as provided by WV BPH

PWSID and System Name:

WV3305205, Pine Grove Water

Number of Generators Needed and Location:

1, at treatment plant

Amp Load:

144, based on 72% loading of the 200 Amp main breaker

Generator Size:

48 kW, 120/240 volt, 3 phase

Notes:

Largest motor is 20 HP

80% power factor used in calculations

Size of power company transformer unknown

EARLY WARNING MONITORING COST ESTIMATE

Description	Cost
Back Panel / Trough / Level (required)	$ 4,350
Probe Module SC1000 (6 sensors)	$ 1,344
Internal Card SC1000 (4 mA inputs)	$879
Display Module SC1000	$ 2,770
Conductivity Sensor	$860
FP360 SC Sensor, 500 ppb, SS, 1.5 m Cable	$ 17,480
ORP Sensor	$ 880
pH Sensor, Ryton	$ 800
Installation	$ 20,637
TOTAL =	**$ 50,000**

OPERATION & MAINTENATNCE COST ESTIMATE

Description	Cost
Annual O&M Cost	$ 750
TOTAL=	**$ 750**

BACKUP INTAKE

Intake Pricing Parameters	Cost per GPM
If the GPM needed is Greater than or Equal to 1,000 GPM (12" Pipe)	$ 1,500.00
If the GPM needed is between 700 GPM to 999 GPM (8" Pipe)	$ 1,750.00
If the GPM needed is less than 700 GPM (6" Pipe)	$ 2,000.00
Intake pricing includes acreage, pumps, screens, concrete, raw water well, electricity, etc.	**$ 260,000.00**

Utility Information		
Existing Capacity	130	GPM
Footage Needed	9,700	LF

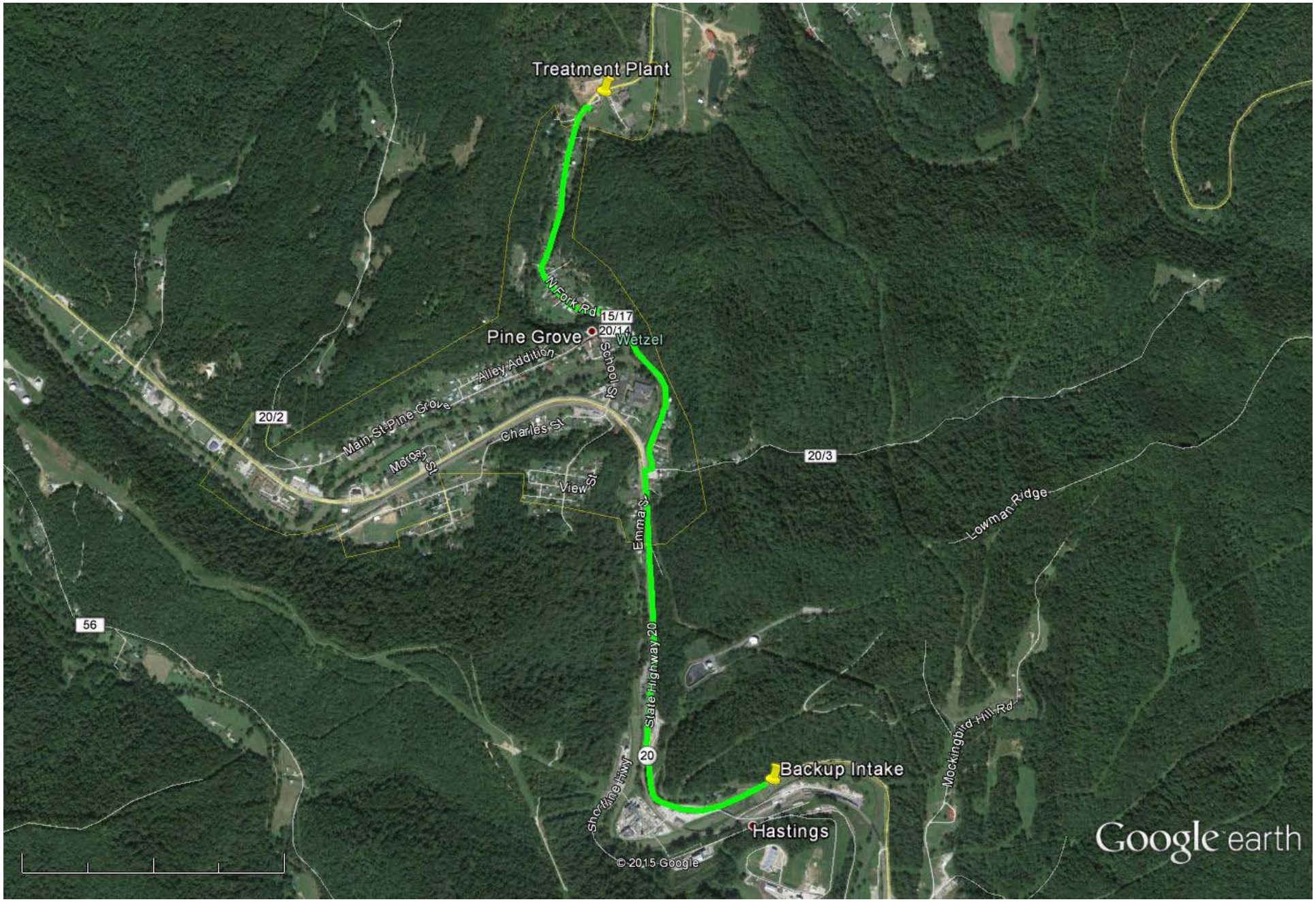
Piping Size	Cost per Foot	Footage	Totals
12" Pipe	$ 60.00	-	$ -
8" Pipe	$ 37.00	-	$ -
6" Pipe	$ 34.00	9,700	$ 329,800.00
			$ 329,800.00

Assumptions
Water will be taken from the South Fork Fishing Creek. According to the WVDNR, the South Fork Fishing Creek is a mussel stream and will likely require a survey to be completed during permitting. Permits required would include WV DEP, WV BPH, WV DNR, ACOE, WV SHPO, US FWS, WV DOH and County Floodplain. Additional fees are predicted to be 30% of overall cost. The fees include legal, engineering and accounting needs, as well as obtaining rights-of-way from landowners.

Additional Environmental Costs		
Mussel Survey	Yes	$ 15,000.00
Permits	Yes	$ 10,000.00
		$ 25,000.00

Totals	
Intake	$ 260,000.00
Piping	$ 329,800.00
Permitting	$ 25,000.00
Additional Fees	$ 185,000.00
Total Cost	**$ 800,000.00**

The piping route is included on the following page.



Google earth

miles 1

km 2

INTERCONNECTION COST ESTIMATE

Pricing Parameters
If the GPM needed is Greater than or Equal to 1,000 GPM (12" Pipe)
If the GPM needed is between 700 GPM to 999 GPM (8" Pipe)
If the GPM needed is less than 700 GPM (6" Pipe)

Utility Information		
Existing Capacity	130	GPM
Footage Needed	2,000	LF

Price for First 1,000 LF					
Item	**Unit**	**$/Unit**	**Gate Valve (2)**	**Meter**	**Cost Per Foot**
12" Pipe	LF	$ 60.00	$ 4,400.00	$ 2,450.00	$ 66.85
8" Pipe	LF	$ 37.00	$ 2,530.00	$ 2,450.00	$ 41.98
6" Pipe	LF	$ 34.00	$ 1,880.00	$ 2,450.00	$ 38.33

Additional Costs		
Permitting	$	10,000.00

Additional Footage after 1,000 LF				
Item	**Unit**	**$/Unit**	**Gate Valve (1)**	**Cost Per Foot**
12" Pipe	LF	$ 60.00	$ 2,200.00	$ 62.20
8" Pipe	LF	$ 37.00	$ 1,265.00	$ 38.27
6" Pipe	LF	$ 34.00	$ 940.00	$ 34.94

Total Cost of Interconnection		
First 1,000 LF	$	38,330.00
Additional Footage	$	34,940.00
Permiting	$	10,000.00
Additional Fees	$	20,817.50
Total	**$**	**105,000.00**

The piping route is included on the following page.

Assumptions
One gate valve per 1,000 feet of additional water line. Non-rocky conditions. Additional Fees predicted to be 25% of overall cost. These include legal, engineering and accounting requirements. Permits would include WVDEP, WVBPH, WVDNR, ACOE, WVSHPO, USFW, WVDOH and County Floodplain. Costs for each item include materials and labor.

TREATED WATER TANK COST				
Gallons	**Tank Dimension**	**Model Number**	**Cost**	**Cost Per Gallon**
50,000	16.78‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 17 33 - SSWT	$ 125,000	$ 2.50
105,000	25.17‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 25 28 - SSWT	$ 155,000	$ 1.48
139,000	25.17‘dia. x 37.59’ sidewall height	AQUASTORE tank Model 25 38 - SSWT	$ 180,000	$ 1.29
209,000	30.77‘dia. x 37.59’ sidewall height	AQUASTORE tank Model 31 38 - SSWT	$ 225,000	$ 1.08
297,000	39.16‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 39 33 - SSWT	$ 285,000	$ 0.96
438,000	47.55‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 48 33 - SSWT	$ 345,000	$ 0.79
491,000	50.35‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 50 33 - SSWT	$ 365,000	$ 0.74
607,000	55.95‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 56 33 - SSWT	$ 425,000	$ 0.70
691,000	64.34‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 64 28 - SSWT	$ 470,000	$ 0.68
816,000	69.93‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 70 28 - SSWT	$ 510,000	$ 0.63
948,000	69.93‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 70 33 - SSWT	$ 555,000	$ 0.59
1,025,000	72.73‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 73 33 - SSWT	$ 595,000	$ 0.58
1,260,000	72.73‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 73 33 - SSWT	$ 695,000	$ 0.55
1,453,000	97.91‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 98 28- SSWT	$ 790,000	$ 0.54
1,601,000	97.91‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 98 28- SSWT	$ 870,000	$ 0.54
1,789,000	103.5‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 104 28- SSWT	$ 945,000	$ 0.53
2,026,000	120.29‘dia. x 23.84’ sidewall height	AQUASTORE tank Model 120 24- SSWT	$ 1,052,000	$ 0.52

COSTS OF ADDITIONAL ITEMS AND ASSUMPTIONS	
Access Road and Site Preparation	$ 75,000
Yard Piping and Vault	13%
Bonds/Permits	$ 20,000
Fencings	$ 35,000
Engineering/Accounting/Legal Fees	25%
Level-Sensing and Measuring Equipment	$ 10,000
Rock Excavation of Foundation (if encountered)	5%
ASSUMPTIONS: *Cost are based on a standpipe glass lined tank. Price includes access roads and site preparation (assuming land would need to be purchased for the tank site), telemetry, excavation in rock (% of Tank Cost), valve vault and piping (% of tank Cost), fencing. Price does not include additional waterline from site to water system. Fees for engineering, legal and accounting services will be 25% of the overall project cost.*	

TOTAL COST (INCLUDING ADDITIONAL ITEMS) OF TREATED WATER STORAGE				
Gallons	**Tank Dimension**	**Model Number**	**Cost**	**Cost Per Gallon**
50,000	16.78‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 17 33 - SSWT	$ 359,375	$ 7.19
105,000	25.17‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 25 28 - SSWT	$ 403,625	$ 3.84
139,000	25.17‘dia. x 37.59’ sidewall height	AQUASTORE tank Model 25 38 - SSWT	$ 440,500	$ 3.17
209,000	30.77‘dia. x 37.59’ sidewall height	AQUASTORE tank Model 31 38 - SSWT	$ 506,875	$ 2.43
297,000	39.16‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 39 33 - SSWT	$ 595,375	$ 2.00
438,000	47.55‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 48 33 - SSWT	$ 683,875	$ 1.56
491,000	50.35‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 50 33 - SSWT	$ 713,375	$ 1.45
607,000	55.95‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 56 33 - SSWT	$ 801,875	$ 1.32
691,000	64.34‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 64 28 - SSWT	$ 868,250	$ 1.26
816,000	69.93‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 70 28 - SSWT	$ 927,250	$ 1.14
948,000	69.93‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 70 33 - SSWT	$ 993,625	$ 1.05
1,025,000	72.73‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 73 33 - SSWT	$ 1,052,625	$ 1.03
1,260,000	72.73‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 73 33 - SSWT	$ 1,200,125	$ 0.95
1,453,000	97.91‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 98 28- SSWT	$ 1,340,250	$ 0.92
1,601,000	97.91‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 98 28- SSWT	$ 1,458,250	$ 0.91
1,789,000	103.5‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 104 28- SSWT	$ 1,568,875	$ 0.88
2,026,000	120.29‘dia. x 23.84’ sidewall height	AQUASTORE tank Model 120 24- SSWT	$ 1,726,700	$ 0.85

RAW WATER TANK COST				
Gallons	**Tank Dimension**	**Model Number**	**Cost**	**Cost Per Gallon**
105,000	25.17‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 25 28 - SSWT	$ 155,000	$ 1.48
139,000	25.17‘dia. x 37.59’ sidewall height	AQUASTORE tank Model 25 38 - SSWT	$ 180,000	$ 1.29
209,000	30.77‘dia. x 37.59’ sidewall height	AQUASTORE tank Model 31 38 - SSWT	$ 225,000	$ 1.08
297,000	39.16‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 39 33 - SSWT	$ 285,000	$ 0.96
438,000	47.55‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 48 33 - SSWT	$ 345,000	$ 0.79
491,000	50.35‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 50 33 - SSWT	$ 365,000	$ 0.74
607,000	55.95‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 56 33 - SSWT	$ 425,000	$ 0.70
691,000	64.34‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 64 28 - SSWT	$ 470,000	$ 0.68
816,000	69.93‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 70 28 - SSWT	$ 510,000	$ 0.63
948,000	69.93‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 70 33 - SSWT	$ 555,000	$ 0.59
1,025,000	72.73‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 73 33 - SSWT	$ 595,000	$ 0.58
1,260,000	72.73‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 73 33 - SSWT	$ 695,000	$ 0.55
1,453,000	97.91‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 98 28 - SSWT	$ 790,000	$ 0.54
1,601,000	97.91‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 98 28 - SSWT	$ 870,000	$ 0.54
1,789,000	103.5‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 104 28- SSWT	$ 945,000	$ 0.53
2,026,000	120.29‘dia. x 23.84’ sidewall height	AQUASTORE tank Model 120 24- SSWT	$ 1,052,000	$ 0.52

COSTS OF ADDITIONAL ITEMS AND ASSUMPTIONS	
Access Road and Site Preparation	$ 75,000
Yard Piping, Valve Vault, and Mixing Equipment	20%
Upgrades to Raw Water Intake Pumps	10%
Bonds/Permits	$ 20,000
Fencing	$ 35,000
Engineering/Accounting/Legal Fees	25%
Level-Sensing and Measuring Equipment	$ 10,000
Rock Excavation of Foundation (if encountered)	5%

ASSUMPTIONS: *Cost are based on a standpipe glass lined tank. Price includes access roads and site preparation (assuming land would need to be purchased for the tank site), telemetry, excavation in rock (% of Tank Cost), yard piping at tank site, control valve(s) and vault, as well as mixing equipment and fencing (% of Tank Cost). Price does not include additional waterline from site to water system. Fees for engineering, legal and accounting services will be 25% of the overall project cost.*

TOTAL COST (INCLUDING ADDITIONAL ITEMS) OF RAW WATER STORAGE				
Gallons	**Tank Dimension**	**Model Number**	**Cost**	**Cost Per Gallon**
105,000	25.17‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 25 28 - SSWT	$ 436,563	$ 4.16
139,000	25.17‘dia. x 37.59’ sidewall height	AQUASTORE tank Model 25 38 - SSWT	$ 478,750	$ 3.44
209,000	30.77‘dia. x 37.59’ sidewall height	AQUASTORE tank Model 31 38 - SSWT	$ 554,688	$ 2.65
297,000	39.16‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 39 33 - SSWT	$ 655,938	$ 2.21
438,000	47.55‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 48 33 - SSWT	$ 757,188	$ 1.73
491,000	50.35‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 50 33 - SSWT	$ 790,938	$ 1.61
607,000	55.95‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 56 33 - SSWT	$ 892,188	$ 1.47
691,000	64.34‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 64 28 - SSWT	$ 968,125	$ 1.40
816,000	69.93‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 70 28 - SSWT	$ 1,035,625	$ 1.27
948,000	69.93‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 70 33 - SSWT	$ 1,111,563	$ 1.17
1,025,000	72.73‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 73 33 - SSWT	$ 1,179,063	$ 1.15
1,260,000	72.73‘dia. x 33.01’ sidewall height	AQUASTORE tank Model 73 33 - SSWT	$ 1,347,813	$ 1.07
1,453,000	97.91‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 98 28 - SSWT	$ 1,508,125	$ 1.04
1,601,000	97.91‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 98 28 - SSWT	$ 1,643,125	$ 1.03
1,789,000	103.5‘dia. x 28.43’ sidewall height	AQUASTORE tank Model 104 28- SSWT	$ 1,769,688	$ 0.99
2,026,000	120.29‘dia. x 23.84’ sidewall height	AQUASTORE tank Model 120 24- SSWT	$ 1,950,250	$ 0.96

APPENDIX E. SUPPORTING DOCUMENTATION

E-1. Protection Team Meeting

Date: 5/26/2016

Location: Pine Grove Fire Station, Pine Grove, WV

Participants: Edgar Sapp, Tim Wilcox, Charles Roberts, John Hurst, Barbara King, and Tetra Tech representative Russell Myers.

- On Thursday May 26, 2016, the Source Water Protection Team for the Town of Pine Grove met to review and update the draft of the SWPP. Chief Operator Tim Flint contacted the team members and arranged the meeting, but was unable to attend at the last minute. He will participate on the team in the future and will comment on the draft plan.
- Russell presented a Powerpoint presentation with highlights of the SWPP draft and accepted comments from the group.
    - The county OEM does have a commodity flow study that will be shared with the water operators in the future. This study will be updated in the near future, and would be a good resource for the operator to have.
    - The team recommended that warning signs be removed from the “Roadways” priority.
    - Priorities: Roads should be #3, Vandalism should be #2 (still an issue for the water system, Barbara is currently reviewing possible security measures), Oil Wells should be #1, and emergency power generation should be #4 (They currently do not have a generator but would like to purchase one for the plant). Large water withdrawals are also a concern. During the dry season, Fishing Creek can get very low. If large quantities of water are withdrawn from the creek during these times it could impact Pine Grove’s source of raw water.
    - The County OEM director holds a bimonthly meeting with oil/gas companies that are active in the area. Representatives for these companies will be invited to the public meeting.
    - The water system is working to establish a “spill response trailer” to be used in the event of another spill or emergency. Mark West is assisting in this effort.
    - The protection team will advertise the public meeting on the fire station sign, Facebook, post office.

E-2. List of Regulated Databases

In addition to PSSC that have been identified by the WVBPH and local efforts, water systems should consider data available from regulatory agencies, such as the US Environmental Protection Agency (USEPA) and the WV Department of Environmental Protection (WVDEP). The follow presents examples of regulatory program databases that should be considered.

USEPA

CERCLIS:

The Superfund program was created by the Comprehensive Environmental Response, Compensation, and Liability Act, amended by the Superfund Amendments and Reauthorization Act. The acts established authority for the government to respond to the release/threat of release of hazardous wastes, including cleanup and enforcement actions. Long-term cleanups at National Priority List sites last more than a year while short term /emergency cleanups are usually completed in less than a year. CERCLIS is a database used by the USEPA to track activities conducted under its Superfund program. CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA. Sites are investigated because of a potential for releasing hazardous substances into the environment are added to the CERCLIS inventory. USEPA learns of these sites through notification by the owner, citizen complaints, state and local government identification, and investigations by USEPA programs other than Superfund. Specific information is tracked for each individual site.

NPDES:

The National Pollutant Discharge Elimination System (NPDES) database identifies facilities permitted for the operation of point source discharges to surface waters in accordance with the requirements of Section 402 of the Federal Water Pollution Control Act. Point sources are discrete conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into public waters.

RCRA:

This database has records for all hazardous waste, generators, and transporters as defined by the Resource Conservation Recovery Act (RCRA). Hazardous waste as defined by RCRA is waste material that exhibits ignitability, corrosivity, reactivity, or toxicity. Hazardous waste comes in many shapes and forms. Chemical, metal, and furniture manufacturing are some examples of processes that create hazardous waste. RCRA tightly regulates all hazardous waste from "cradle to grave" (i.e., from manufacture to disposal).

TRI:

The Toxics Release Inventory (TRI) is a publicly available USEPA database that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded by the Pollution Prevention Act of 1990.

WVDEP

Abandoned Mine Sites:

Abandoned mine features compiled by the Office of Abandoned Mine Lands and Reclamation (AMLR) of the WVDEP. The AMLR eliminates damage that occurred from mining operations prior to August 3, 1977 and is funded by the AML fund. It corrects hazardous conditions and reclaims abandoned and forfeited mine sites. Typical AML features include high walls, portals, refuse piles, and mining structures such as tipples.

AST:

Above Ground Storage Tanks are regulated by the WVDEP and are subject to specific standards. Any facility using an AST should contact the WVDEP Water and Waste Management office for current requirements and further advice at 304-926-0495 or http://www.dep.wv.gov/WWE/abovegroundstoragetanks/Pages/default.aspx .

Coal Dams:

Point and polygonal mining related impoundments regulated by the WVDEP Division of Mining and Reclamation (DMR).

LUST:

The WVDEP became the lead agency for administering the Leaking Underground Storage Tank (LUST) Program with the USEPA's authorization in September 1997. Since then, the WVDEP has overseen the cleanup of released regulated substances, primarily petroleum products. Such releases can originate from overfilling, spilling, or leaking tanks and piping. To report a release from an underground storage tank system, contact the Office of Environmental Remediation at 304-238-1220, ext. 3506. After hours releases should be reported to the statewide emergency spill line at 800-642-3074.

Solid Waste Facilities:

Municipal and non-municipal waste landfills and waste transfers stations are regulated by the WVDEP Division of Waste Management.

Oil and Gas Wells:

The Office of Oil and Gas maintains records on active and inactive oil and gas wells. It also manages the Abandoned Well Plugging and Reclamation Program.

UIC:

The Underground Injection Control (UIC) program is designed to ensure that fluids injected underground will not endanger drinking water sources. The Division of Water and Waste Management regulates Class 5 wells. These wells include agriculture drainage wells, improved sinkholes, industrial disposal wells, storm water wells and septic systems that have the capacity to serve 20 or more people. The following state codes address UIC regulations; 47CSR9, 47CSR13 and 47CSR55. The Division of Mining and Reclamation oversees all mining UIC permits.

UST:

The purpose of the Underground Storage Tank (UST) Section is to regulate underground storage tanks that contain petroleum or hazardous substances to determine compliance with state rules and federal regulations. West Virginia has had full program approval from USEPA since February 1988.

Confidentiality Statement

I have reviewed and understand the requirements to maintain PSSC data in a confidential manner (64CSR3). While I may discuss PSSCs in general terms, I understand that I am not permitted to release exact locations, characteristics or quantities of contaminants to the general public.

Pine Grove Water Department Designees:

Name and Title	Phone	Email	Signature	Date
Edgar Sapp, Director OEM	304-455-6960	WC911@frontier.com	Edgar Sapp	5/24/2016
Tim Wilcox Fire Chief	304-884-3353		Tim Wilcox	5/24/16
Charles Roberts - Citizen	[redacted]	CRoberts@citlink.net	Charles Roberts	5/26/16
John Hurst Council	[redacted]		John Hurst	5/26/16
Barbara King Council			Barbara A. King	5/26/16

Tetra Tech, Inc.
803 Quarrier Street, Suite 400, Charleston, WV 25301
Tel 304-414-0054 Fax 304-720-2334 tetratech.com

Pine Grove Municipal Water

Source Water Protection Plan - Public Meeting

Date 6/14/2016

Attendees:

Name	Organization	Email	Phone
Rhonda Kay Spencer			[redacted]
Roy L. Justice Mayor	Town of Pine Grove		
Barbara King, Council	Town of Pine Grove		
Julie Liggett, Council	Town of PG.	julie.a.liggett@gmail	
John Hunt	Town of P.G.		
Gary L Rymer	Town Attorney	glrymer@frontier.com	

Tetra Tech, Inc.
803 Quarrier Street, Suite 400, Charleston, WV 25301
Tel 304-414-0054 Fax 304-720-2334 tetratech.com

Do your part to keep contaminants out of our children's source water!

Contaminants

Cleaning Products

Automotive Products

Fuel Oil

Furniture Strippers

Oil-based Paints

Sewage

Lawn and Garden Products

Sediments

Pharmaceuticals

Source Water Links

www.wvdhhr.org/oehs/eed/swap/
www.epa.gov/safewater/index.html
www.epa.gov/watersense/
http://orsanco.org

For Kids

www.epa.gov/safewater/kids/index.html
www.epa.gov/watersense/kids/index.html
www.groundwater.org/kids/

Contacts

WV Department of Health and Human Resources
Source Water Assessment and Protection Program
350 Capitol Street, Room 313
Charleston, WV 25301-3713
phone: (304) 558-2981
fax: (304) 558-4322
e-mail: EEDSourceWaterProtection@wv.gov

Pine Grove Water
992 North Fork Road
Pine Grove, WV
304-8893351

Do Your Part

Protect Your Source Water

Protect Your Health

TETRA TECH

Prepared by Tetra Tech
In cooperation with the WVDHHR Source Water Assessment and Protection Program

Drinking water is essential for life. Learn what you can do to protect your drinking water sources.

Pine Grove Water treats water from the North Fork Fishing Creek using conventional treatment methods. The primary concerns for the water system are oil/gas wells, vandalism, roadways, and emergency power generation. There are many ways you can help minimize impacts from these and other activities on your source of drinking water.

Making choices to protect and conserve the source of your drinking water will help keep you, your family, and neighbors safe and healthy now and in the future.

Do Your Part to Protect Source Water

- ✓ Recycle used oil and other automotive products at a service center. Don't pour them on the ground or down storm drains. Storm drains can lead directly to your source water.
- ✓ Fix leaks from your automobile and clean up spills.
- ✓ Apply fertilizers and pesticides as directed. Consider natural alternatives to chemicals.

- ✓ Don't flush pharmaceuticals. Dispose by mixing with coffee grounds or kitty litter, sealing in a container, and placing in the trash. Organize a collection day with a pharmacy and local police department.
- ✓ Take unwanted household chemical waste, such as cleaners, oils, and paints to proper waste collection sites. Don't dump down your sink, toilet, or storm drains. Consider organizing a collection day in your community.
- ✓ Check for leaks at heating fuel tanks and install pads to catch accidental leaks or spills.
- ✓ Report unused water wells to your utility or WVDHHR.
- ✓ Inspect your septic system regularly and pump every 5-10 years.

Do Your Part to Conserve Source Water

- ✓ Turn off the water when you brush your teeth and take shorter showers.
- ✓ Wash full loads of clothes and dishes.
- ✓ Don't use your toilet to flush trash.
- ✓ Fix leaking faucets, toilets, and lines. Consider installing toilets, faucets, and appliances designed to save water.
- ✓ Water your lawn and garden in the morning. Consider installing a rain barrel at your downspouts to collect rain to water your lawn and garden, instead of using treated water.

- ✓ Use native plants in landscape that don't need extra watering. Use mulch to hold moisture.
- ✓ Don't let your garden hose run when washing your car.

- ✓ Don't panic if you are asked to conserve during a drought. Your utility will respond to water shortages based on your normal water use. Running extra water in your home during a drought will make it more difficult to respond to the water shortage.

Conserving water saves on your monthly bill now. Protecting your source water will save on treatment costs later.