Source Water Protection Plan
Elkins City Of

PWSID: WV3304203

Randolph County

August 2020

Prepared By:

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In cooperation with Elkins City Of

WV Bureau for Public Health, Source Water Assessment and Protection Program

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

Responsible party of designee authorized to sign for water utility is on file:

Robert Pingley

Name of Authorizing Signatory:

Robert Pingley

Title of Authorizing Signatory:

6/25/2019

Date of Submission (mm/dd/yyyy):

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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 Elkins City Of 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, Elkins City Of 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 Elkins City Of 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

ELKINS CITY OF 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 ELKINS CITY OF

Administrative office location:	401 Davis Avenue, Elkins, RANDOLPH, WV, 26241		
Is the system a public utility, according to the Public Service Commission rule?	Yes		
Date of Most Recent Source Water Assessment Report:	1/1/2003		
Date of Most Recent Source Water Protection Plan:	10/1/2016		
Population served directly:	8456		
Bulk Water Purchaser Systems:	System Name	PWSID Number	Population
	Midland PSD	WV3304208	3590
	Leadsville PSD	WV3304215	1600
Total Population Served by the Utility:	8456		
Does the utility have source water protection areas(SWPAs)?	No		
How many SWPAs does the utility have?	0		

5.0 WATER TREATMENT AND STORAGE

As required, Elkins City Of 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 Elkins City Of 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. Elkins City Of Water Treatment Information

Default Facility	
Water treatment processes (in order of occurrence) includes:	FLOCCULATION, SEDIMENTATION, RAPID MIX, CHLORINATION (FRDS-1.5)
The treatment capacity is approximately (GPD):	5,500,000
Current average production is approximately (GPD):	2,000,000
Maximum gallons of water treated and produced at that plant in one day during the past year was:	2,764,000
Minimum gallons of water treated and produced at that plant in one day during the past year was:	1,451,000
Plant is operated an average of hours a day:	9
Maximum number of hours of operation in one day at that plant during the past year was:	13
Minimum number of hours of operation in one day at that plant during the past year was:	6
How many storage tank(s) are maintained on systems distrbution system:	3
Total gallons of treated water storage:	4,500,000
Total gallons of raw water storage (GALs):	0
City of Elkins Water Plant	
Water treatment processes (in order of occurrence) includes:	FILTRATION, ULTRAFILTRATION
The treatment capacity is approximately (GPD):	6,000,000
Current average production is approximately (GPD):	1,800,000
Maximum gallons of water treated and produced at that plant in one day during the past year was:	3
Minimum gallons of water treated and produced at that plant in one day during the past year was:	0
Plant is operated an average of hours a day:	7
Maximum number of hours of operation in one day at that plant during the past year was:	12
Minimum number of hours of operation in one day at that plant during the past year was:	4
How many storage tank(s) are maintained on systems distrbution system:	2

Total gallons of treated water storage:	4,500,000
Total gallons of raw water storage (GALs):	

Table 3. Elkins City Of Surface Water Sources

Intake Name	Facility #	Local Name	Describe Intake	State Id Code	Date Constructed / Modified	Frequency of Use (Primary / Backup / Emergency)	Activity Status (Active/Inactive)
INTAKE-TYGART RIVER	1942816	COMMUNITY OF ELKINS PRIMARY	Duel Johnson type Intake Screens feeding into a wet well. (New Construction). This is fed by approximately 1.5 mile inlet water channel, controlled by the City (Old Construction).	IN001	4/1/2018	Permanent	Active

Table 4. Elkins City Of Ground Water Sources

Well/Spring Name	Facility #	Local Name	Date Constructed / Modified	Completion Report Available (Yes/No)	Well Depth (ft)	Casting Depth (ft)	Grout (Yes/No)	Frequency of Use (Primary / Backup / Emergency)	Activity Status (Active/Inactive)

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 warrant 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. 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. The Ohio River ZCC delineations include 1,320 feet (1/4 mile) measured from the bank of the main stem of the Ohio River and 500 feet on a 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

Intake Name	Raw Water Intake
Size of WSDA (Acres)	269
River Watershed Name (8-digit HUC)	Tygart Valley - 05020001
Size of Zone of Critical Concern (Acres)	11518
Size of Zone of Peripheral Concern (Acres) (Include ZCC area)	22901

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 Elkins City Of 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.

Elkins City Of 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
Bob Pingley	Elkins City Of	Operations Manager	(304)635-7021	bpingley@cityofelkinswv.com
Wes Lambert	Elkins City Of	Chief Operator	(304)597-2714	waterplant.elkins@gmail.com
Chris See	Elkins City Of	Randolph County Commission	(304)636-2057	csee@randolphctyev.org
Jeff Kresch	Elkins City Of	Customer Representative	(304)940-1106	jeff.kresch@fishingreportwv.com
Cindy Hart	Elkins City Of	Director	(304)636-0483	ranoem@frontier.com
Russell McClain	Elkins City Of	Professor		w.russ.mcclain@gmail.com
Melody Himes	City of Elkins	Operations Assistant	(304)635-7021	mhimes@cityofelkinswv.com
Jim Ancell	Randolph County Office of Emergency Services	Deputy Director	(304)636-0483	jbancell@gmail.com
Date of First Protection Team Meeting:		Protection Team Meeting was held Thursday, December 10, 2015 at Elkins City Of. Meeting minutes attached in Appendix E.		
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		First took place at city Hall on 12/10/2015. Public meeting on 5/17/2016. The meeting fulfilled a required part of the source water protection planning process. Update: The Source Water Protection Team will meet to discuss projects before March 2021. City of Elkins will be posting the updated Source Water Protection Plan to the Elkins City Hall Facebook page, to the city's website @ www.cityofelkinswv.com and post a copy in the lobby at Elkins City Hall. City of Elkins encourages the public to review the changes and submit questions to the Operations Division @ 304-635-7021.		

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. Elkins City Of 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	The water system could hold an informational meeting with local residents about source water protection efforts. The meeting will increase awareness of the connection between land use and drinking water quality. This meeting could be structured as a water fair/public event with drinking water displays and activities. This can be combined with activities of the local watershed associations.	Utility staff, utility customers	Completed	Advertised	Minimal
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	Ongoing	In addition to Source Water Assessment information	Included in annual budget
Consumer Confidence Report	Due to recent heightened concerns about the effects of pharmaceuticals in surface water bodies and the fact that many source water areas are in a karst landscape, the utility should include information about pharmaceuticals and how to properly dispose of them in the CCR.	n/a	Ongoing	The City of Elkins collaborates with local health officials and community agencies to provide a bin at city hall for pharmaceuticals drop off. The City of Elkins also supports drug take back events.	

Table 10. Education and Outreach Implementation Plan

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status / Schedule	Comments	Estimated Cost
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. See Appendix E for example letters and a brochure that can be customized. Funding for the brochures may be available through the Wellhead and Source Water Protection Grant Program.	Utility staff	Ongoing		
Brochures, Pamphlets, and Letters	Several organizations provide information and resources on the internet, related to certain source water concerns and PCSs. The utility will consider obtaining these materials when needed, to educate the community. Examples of these resources are described below.	Utility staff	Ongoing		
Brochures, Pamphlets, and Letters	Due to recent heightened concerns about the effects of pharmaceuticals in surface water bodies, the Ohio River Valley Water Sanitation Commission (ORSANCO) developed a pamphlet regarding pharmaceutical disposal. This pamphlet can be viewed and possibly ordered from: http://orsanco.org/index.php/brochures	Utility staff	Ongoing		
Brochures, Pamphlets, and Letters	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.	Utility staff	Ongoing		

Table 10. Education and Outreach Implementation Plan

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status / Schedule	Comments	Estimated Cost
Brochures, Pamphlets, and Letters	USEPA Water Sense Simple Steps to Save Water (EPA-832-F-07-011) presents benefits of conserving water. Focusing not only on the environment, but also on the financial savings associated with conservation. The brochure can be viewed at: http://www.epa.gov/watersense/docs/ws_simplesteps508.pdf	Utility staff	Ongoing		
School Curricula	Work with the school system to incorporate source water activities into the school curricula. One example of school curricula is Project WET. For more information regarding free workshops to educate area teachers on Project WET, visit http://www.dep.wv.gov/WWE/getinvolved/WET/Pages/default.aspx, or contact the WVDEP at 304-926-0495.	Utility Staff	Ongoing	Operator will initiate effort, to locate the appropriate individuals in school and/or on local school board. Can provide websites with free educational materials to promote source water protection and visit classroom.	Minimal costs. Would require time to visit classroom.
School Curricula	In addition, the USEPA offers free educational materials for teachers and students, including classroom lessons, fact sheets, and interactive games and activities, for grades K-12. These materials can be accessed at the following websites. For general source water protection: http://www.epa.gov/safewater/kids/index.html. For water conservation: http://www.epa.gov/watersense/resources/educational_materials.html Similar protection and conservation related resources can be found at the Groundwater Foundation website; http://www.groundwater.org/kc/kc.html."	n/a	Ongoing		

Table 10. Education and Outreach Implementation Plan

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status / Schedule	Comments	Estimated Cost
School Curricula	Visit school or invite students for a plant tour to tie in with school curricula.	Utility Staff	Ongoing	Davis and Elkins College students have toured the Water Treatment Plant as part of their Environmental Science class. These tours are available to all students.	
School Curricula	Ask the school to include message in school newsletter to raise awareness about source water protection and conservation.	Utility Staff	Ongoing		
Plant Tours	Provide tours of the water plant to interested organizations such as watershed groups, schools, and civic organizations. Tours will be offered as requested.	Bob Pingley, Wes Lambert, Melody Himes	Ongoing		
Plant Tours	Organize a tour with local Emergency Responders to make them familiar with the facilities in the event of an emergency.	Bob Pingley, Wes Lambert, Melody Himes	Ongoing		

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 Elkins City Of is provided in **Table 11**.

11.1. RESPONSE NETWORKS AND COMMUNICATION

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.

Table 11. Elkins City Of Water Shortage Response Capacity

Can the water utility isolate or divert contamination from the intake and groundwater supply?	Yes
Describe the results of an examination and analysis of the public water system's ability to isolate or divert contaminated waters from its surface water intake or groundwater supply:	The utility has no alternative source that can supply them at full capacity, but they could receive some water from two different interconnections with Beverly and Huttonsville PSD that could supplement their production.
Describe the results of an examination and analysis of the public water system's existing ability to switch to an alternative water source or intake in the event of contamination of its primary water source:	
Is the Utility able to close the water intake in the event of a spill?	Yes
How long can the Utility keep the intake closed?	2.2 days
Describe the process to close the intake:	The operator can shut down the raw water pumps to stop water from entering the plant.
Describe the treated water system's storage capacity of the water system:	The City of Elkins can shut down the raw water pumps to stop water from entering the plant.
Gallons of storage capacity (raw water)	0
Gallons of storage capacity (treated water)	4,500,000
Is the Utility a member of WVRWA Emergency Response Team?:	Yes
Is the Utility a member of WV-WARN?:	Yes
List other agreements to provide receive assistance in case of emergency:	Citys of Buckhannon, Parsons, Huttonsville

11.2. OPERATION DURING LOSS OF POWER

Elkins City Of 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

Can you connect to a generator at the intake/wellhead?:	Yes
Please provide a scenario that best describes your system:	The City has a 1200KW Cummins Generator permanently stationed at the Intake Campus
What do you have (KW)?	1200.00
What do you need (KW)?	1200.00
Can you connect to a generator at the treatment facility?:	Yes
Please provide a scenario that best describes your system:	The City has a 1200KW Cummins Generator permanently stationed at the Main Treatment Plant
What do you have (KW)?	1200.00
What do you need (KW)?	1200.00

Can you connect to a generator at the distribution system?:		Yes	
Please provide a scenario that best describes your system:		In an emergency, the City has a portable Cummins Generator to run Midland and Leadsville booster stations. A permanent generator is stationed at Bear Hunter booster site	
What do you have (KW)?		80.00	
What do you need (KW)?		80.00	
Does the utility have fuel on hand for generator?:		Yes	
Hours:		24	
Gallons:		2,000	
Provide a list of suppliers and alternate suppliers that could provide fuel in the event of an emergency:		Supplier	Phone Number
	Fuel	Woodford	(800)927-3688
	Generator	Cummins Sales	(304)367-0196
Does the utility test the generator(s) periodically?:		Yes	
Does the utility routinely maintain the generator(s)?:		Yes	
If the Utility does not have generator or the ability to connect to a generator, describe plans to respond to power outages:			

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. Elkins City Of 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 Elkins City Of

Is the Utility able to meet water demands with the current capacity for the next five years?	Yes
Explain how you plan to do so:	The Current Facility is designed to treat a total 6.0 MGD. Our current demand is only 1.8 MGD.

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 13** is taken from the most recently submitted Elkins City Of PSC Annual Report.

Table 14. Water Loss Information

Water pumped - Total Gallons:		704,861,000
*Water purchased - Total Gallons:		0
Total gallons of water pumped and purchased:		704,861,000
Total gallons of water loss accounted for except main leaks:	Mains, plaint, filters, flushing, etc - Total Gallons:	0
	Fire department - Total Gallons:	672,000
	Back washing - Total Gallons:	0
	Blowing settling basins - Total Gallons:	0
Total Accounted for Water Loss		672,000
Unaccounted for lost water - Total Gallons:		30,000,000
Water sold - Gallons:		632,901,000
Total Gallons of Unaccounted for Lost Water and Water Lost from Main Leaks:		71,288,000
Total percent unaccounted for water		10
Describe the measures to correct water loss greater than 15%:	The utility regularly detects and fixes leaks throughout the system. They have also hired American Leak Detection (304-986-3368) to come and address the system.	

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.

Elkins City Of 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?	Yes	
From whom do you receive notices?	They regularly receive notifications emails from the WV Bureau for Public Health regarding spills in the region. They have also received notifications from upstream utilities like Beverly.	
Are you aware of any facilities, land uses, or critical areas within your protection areas where chemical contaminants could be released or spilled?	Yes	
Are you prepared to detect potential contaminants if notified of a spill?	Yes	
List laboratories (and contact information) on whom you would rely to analyze water samples in case of a reported spill.	Laboratories	
	Name	Phone Number
	Reliance Laboratories-Bridgeport, WV	(304)482-5285
	REIC Laboratory-Beaver, WV	(800)999-0105
	Clarksburg Water Board-Clarksburg, WV	(304)642-5467
Do you have an understanding of baseline or normal conditions for your source water uality that accounts for seasonal fluctuations?	Yes	
Does your utility (aside from turbidity monitoring) currently monitor your raw water through continuous monitoring at the surface water intake or groundwater source to detect changes in water quality that could indicate contamination?	No	
Does your utility collect periodic grab samples (ex. possess reserved sample bottles, on-call laboratory services, and trained personnel) in response to a spill notification or to investigate changes in water quality that could indicate contamination?	No	

Please explain:		
Provide or estimate the capital and O&M costs for your current or proposed early warning system or upgraded system.	Capital Cost:	24,155
	O&M Cost:	1,979
Do you serve more than 100,000 customers?		No
Does your system currently receive spill notifications from a state agency, neighboring water system, local emergency responders, or other facilities?		Yes
Are you prepared to detect potential contaminants if notified of a spill?		Yes
Please describe the methods you use to monbitor at the same technical levels utilized by ORSANCO:		

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

Elkins City Of 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. Elkins City Of 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 Elkins City Of 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

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 Elkins City Of'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 C. COMMUNICATION PLAN TEMPLATE

Elkins City Of

PWSID: WV3304203

Authorizing Signature: Bob Pingley

Contact Phone Number: (304)636-1414

Contact Email Address: bpingley@cityofelkinswv.com

Plan Developed On: June 2019

ACKNOWLEDGMENTS:

This plan was developed by [insert name, title of person completing plan, and who they work for] to meet certain requirements of the Source Water and Assessment Protection Program (SWAPP) and the Wellhead Protection Program (WHPP) for the State of West Virginia, as directed by the federal Safe Drinking Water Act (SDWA) and state laws and regulations.

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	Announcement	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	Boil 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	Cannot 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	Do 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	Emergency	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
WDTV Channel 5	Elkins City Of	(304)848-5000	news@wvtv.com	CBS Affiliate Bridgeport WV
WBOY Channel 12	Elkins City Of	(304)623-3311	hhtt//www.wboy.com@_	Regional TV Clarksburg WV
Intermountain Newspaper	Elkins City Of	(304)472-8302	www.theintermountain.com@_	Local Newspaper

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., Announcement, Boil Water Advisory, Cannot Drink, Do Not Use, or Emergency)
  - 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

If time permits and the need arises, after the threat level is reduced, and operations return to normal, the water system staff, the communication and source water protection teams, and their partners may 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.

EMERGENCY SHORT FORMS

Emergency Communication Information

	Name	Phone	Email
Designated spokesperson:	Bob Pingley	(304)636-1414	bpingley@cityofelkinswv.com
Alternate spokesperson:	Wes Lambert	(681)298-5200	waterplant.elkins@gmail.com
Designated location to disseminate information to media:	Elkins City Hall		
Method of Contact:	Randolph County Nixle communication system email twitter facebook tv newspaper radio utility website email list		

Media Contacts:	Name	Title	Phone Number	Email
	WDTV Channel 5	Elkins City Of	(304)848-5000	news@wvtv.com
CBS Affiliate Bridgeport WV	WBOY Channel 12	Elkins City Of	(304)623-3311	hhtt//www.wboy.com@_
Regional TV Clarksburg WV	Intermountain Newspaper	Elkins City Of	(304)472-8302	www.theintermountain.com@_

Emergency Service Contacts

	Name	Emergency Phone	Alternative Phone	Email
Police	City of Elkins	(911)___-____	(304)636-0678	
Fire	Elkins Fire Department	(911)___-____	(304)636-3433	
Ambulance	Randolph County Squad 1	(911)___-____	(304)636-6593	
Hazmat	Elkins Fire Department	(911)___-____		
Other	Local Health Department	(304)636-0396		
Other				
Other				

Sensitive Populations

Other Communities that are served by the Utility:	Leadsville PSD, Midland PSD			
Major User/Sensitive Population Notification	Name	Emergency Phone	Alternative Phone	Email
	Davis Medical Center	(304)636-3300		
	Elkins Middle School	(304)636-9176		
	Davis and Elkins College	(304)637-1900		
	North Elementary School	(304)636-9188		
EED District Office Contact	Name	Phone	Email	
		(304)368-2530		
OEHS Readiness Coordinator	Lee Orr	(304)356-4290		

Downstream Water System Contacts	Water System Name	Contact Name	Emergency Phone	Alternate Phone	Email
	Town of Belington	Don Harris	(304)823-1611		
	City of Philippi	Billy Knight	(304)457-3700		
	Taylor County PSD	Neil Dunsmore	(304)265-5569		
	Town of Monongah				

Are you planning on implementing the TIER Communications plan?:	Yes

Emergency Service Key Staff Members

	Name	Title	Phone	Email
Key Staff Responsible for Coordinating Emergency Response Rrocedures:	Bob Pingley	Operations Manaager	(304)636-1414	bpingley@cityofelkinswv.com
Staff Responsible for Keeping Confidential PSSC Information and Releasing to Emergency Responders.	Bob Pingley	Operations Manager	(304)636-1414	bpingley@cityofelkinswv.com

Emergency Response Information

List Laboratories available to perform sample analysis in case of emergency.	Name	Phone
	Reliance Laboratories	(304)842-5285
	REIC Laboratory	(800)999-0105
	Clarksburg Water Board	(304)642-5467
Has utility developed a detailed Emergency Response Plan in accordance with the Public Health Security Bioterrorism preparedness and Response Plan Act of 2002 that covers the following areas?:		Yes
When was the emergency response plan developed or last updated?:		2014

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/

APPENDIX D. SINGLE SOURCE FEASIBILITY

Water Source Alternative:

Back up intake	
Name of Alternative:	Backup Intake on Shavers fork
Brief Description of the Alternative:	Backup Intake on Shavers fork
Feasible?:	Yes
Provide Cost Estimate:	$9,978,000
Would this alternative supply 100% of your needs?:	Yes
Economic Criteria - Operation and Maintenance Costs:	3
Economic Criteria - Capital Cost:	0
Technical Criteria - Permitting:	0
Technical Criteria - Flexibility:	0
Technical Criteria - Resilience:	0
Technical Criteria - Institutional Requirements:	0
Environmental Criteria - Environmental Impacts:	0
Environmental Criteria - Aesthetic Impacts:	0
Environmental Criteria - Stakeholder Issues:	0
Final Score:	20.00%

Feasibility Study Narrative

Source Water Protection Plan

Contingency Plan and Feasibility Study

ELKINS MUNICIPAL WATER

PWSID WV3304203
RANDOLPH COUNTY

December 2015

Prepared by:

Tetra Tech, Inc.
803 Quarrier Street, Suite 400
Charleston, WV 25314

In cooperation with Elkins Municipal Water

TETRA TECH

Victor A. D'Amato
Victor D'Amato, PE

12-8-15
Date

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Appendices

Background

To fulfill the requirements of Senate Bill 373 and Legislative Rule 64 CSR 3, Elkins Municipal Water has participated in a study to evaluate its existing contingency planning and feasibility of source water alternatives. This Contingency Planning and Feasibility Study report documents the results of the study and provides information about the utility's **ability to prevent contaminants** from entering the water system if possible, and sufficiently respond to an emergency if necessary. This report represents only a portion of the required elements of the Source Water Protection Plan for Elkins Municipal Water. The information presented in this report will be included in the final Source Water Protection Plan.

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 plant, and distribution system from contamination. They should also review their ability to use alternative sources, minimize water loss, meet future water demands, and operate during power outages. In addition, utilities should report the feasibility of establishing an early warning monitoring system. The following sections address these considerations and present information required for the source water protection plan.

Responding to Water Shortage or Contamination Event

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 Elkins Municipal Water is provided in **Table 1**.

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/). Elkins Municipal Water has analyzed its ability to effectively respond to emergencies and this information is provided in **Table 1**.

Table 1. Elkins Water Shortage Response Capability

Can the utility isolate or divert contamination from the intake or groundwater supply?	Yes, depending on where the contaminant is and how much advance notice they have.
Describe the utility's capability to isolate or divert potential contaminants:	The utility has the ability to close off the reservoir from the main flow of the Tygart Valley River. They can shut a valve on a dam west of downtown Elkins to isolate the impoundment from the river, but this would only be effective if the contaminant had not already entered the reservoir. If they had enough advance notice, they could close off the reservoir and still have enough raw water to allow a contaminant plume to pass.
Can the utility switch to an alternative water source or intake that can supply full capacity at any time?	No
Describe in detail the utility's capability to switch to an alternative source:	The utility has no alternative source that can supply them at full capacity, but they could receive some water from two different existing interconnections with Beverly and Huttonsville PSD that could supplement their production.
Can the utility close the water intake to prevent contamination from entering the water supply?	Yes
How long can the intake stay closed?	If the treated water tanks were full when the intake was closed, the system could operate for approximately 2.2 days before it experienced a water shortage.
Describe the process to close the intake:	The operator can shut down the raw water pumps to stop water from entering the plant.
Describe the raw and treated water storage capacity of the water system:	The City of Elkins water system has 3 treated water storage tanks and no booster pump stations. McQuain Tank- 1,000,000 gal. Crystal Springs Tank- 2,000,000 gal. High Street Tank- 1,500,000 gal. Total- 4,500,000 gal. The system is planning to build a new 3,000,000 gal. tank beside the existing McQuain Tank, after which the Crystal Springs and McQuain Tanks will be

	decommissioned. This project should be completed in about a year. The utility also has roughly 30 days (operator estimate) of raw water stored in the impoundment if they were to close the valves on the dams. A 2005 study of the impoundment revealed that it held about 64 million gallons.
Is the utility a member of WVRWA Emergency Response Team?	Yes
Is the utility a member of WV-WARN?	Yes- the City of Elkins is a founding member of WV-WARN
List any other mutual aid agreements to provide or receive assistance in the event of an emergency:	The City of Elkins water department has informal mutual aid agreements with the City of Buckhannon, Parsons, Huttonsville

Operation during Loss of Power

Elkins Municipal 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 2**.

Table 2. Elkins Municipal Water Generator Capacity

What is the type and capacity of the emergency power generation needed to operate during a loss of power?	According to the WV BPH, the Elkins water treatment plant would require a 1,480 kW 3-phase diesel generator to operate during a power outage. The operator stated, however, that they have never been able to connect to a generator because of a voltage problem with the treatment plant. The new plant (which will hopefully be completed within a few years) will be equipped with a generator to power both it and the raw water intake (750 kW for both).
Can the utility connect to generator at the intake/wellhead? If yes, select a scenario that best describes system.	No
Can the utility connect to generator at treatment facility? If yes, select a scenario that best describes system.	No

Can the utility connect to a generator in distribution system? If yes, select a scenario that best describes system.		No-The system does not have any booster pump stations that would require a generator.	
Does the utility have adequate fuel on hand for the generator?		N/A	
What is your on-hand fuel storage and how long will it last operating at full capacity?		**Gallons**	**Hours**
		None	None
Provide a list of suppliers that could provide generators and fuel in the event of an emergency:	**Supplier**		**Contact Information**
	Generator	Mountaineer Generator-Elkins, WV	304-636-0011 info@mountaineergs.com
	Generator	Crites Electric- Buckhannon, WV	304-472-0148 rustyc@criteselectric.com
	Fuel	Woodford Oil- Elkins, WV	304-636-2688 info@woodfordoil.com
	Fuel	Guttman Oil- Elkins, WV	304-636-2600
Does the utility test the generator(s) periodically?		N/A	
Does the utility routinely maintain the generator?		N/A	
If no, what 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:		The utility cannot pump during a power outage. They have no choice but to shut down and wait for the power to come back on.	

Future Water Supply Needs

When planning for potential emergencies and developing contingency plans, a utility needs not only to 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. Elkins Municipal Water has analyzed its ability to meet future water demands at current capacity, and this information is included in **Table 3**.

Table 3. Future Water Supply Needs for Elkins Municipal 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. The utility expects only modest growth in demand in the area, and when the new plant is online they do not expect to have any trouble meeting demand over the next 5 years. The water system's opinions concerning the demand for the next five years are generally supported by population trends projected based on US Census Bureau 2000 and 2010 data. According to the 2005 Interim State Population Projections [(1)], WV as a whole will see a population decline between 2010 and 2030. Researchers at the WVU College of Business and Economics specifically project that populations within Randolph County will increase from a population of 29,405 in 2010 to a projected population of 30,134 in 2020[(2)], but the capacity of the new plant will be able to compensate for this modest growth if it were to all occur in the service area. Census data and projections cannot account for increases in daily demand due to water line extensions. If, in the future, water line extension projects are proposed the daily demands will be reassessed to determine if the source and treatment facilities can support increased demand.
If not, describe the circumstances and plans to increase production capacity:	N/A

(1) US Department of Commerce, United State Census Bureau. 2005 Interim State Population Projections. Table 1. http://www.census.gov/population/projections/data/state/projectionsagesex.html. Accessed June 10, 2015.

(2) Christiadi, Ph.D., Deskins, John, Ph.D., Lego, Brian. WVU College of Business and Economics, Bureau of Business and Economic Research. March 2014. WVU Research Corporation. http://be.wvu.edu/bber/pdfs/BBER-2014-04.pdf Accessed June 10, 2015.

Water Loss

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. This can include unmetered uses, leaks, and other losses. 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 uses such as 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 can calculate 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 shortage or other emergency and should be included in the calculation of percentage of water loss for purposes of the source water protection plan. The data in **Table 4** is taken from the most recently submitted Elkins Municipal Water PSC Annual Report.

Table 4. Water Loss Information*

Total Water Pumped (gal)		704,861,000
Total Water Purchased (gal)		0
Total Water Pumped and Purchased (gal)		704,861,000
Water Loss Accounted for Except Main Leaks (gal)	**Mains, Plants, Filters, Flushing, etc.**	0
	Fire Department	672,000
	Back Washing	0
	Blowing Settling Basins	0
Total Water Loss Accounted For Except Main Leaks		672,000
Water Sold- Total Gallons (gal)		632,901,000
Unaccounted For Lost Water (gal)		30,000,000
Water lost from main leaks (gal)		41,288,000
Total gallons of Unaccounted for Lost Water and Water Lost from Main Leaks (gal)		71,288,000
Total Percent Unaccounted For Water and Water Lost from Main Leaks (gal)		10.1%
If total percentage of Unaccounted for Water is greater than 15%, please describe any measures that could be taken to correct this problem:	The utility regularly detects and fixes leaks throughout the system. They have also hired American Leak Detection (304-986-3368) to come and assess the system.	

*Information from the 2015 Public Service Commission Annual Report for Elkins Municipal Water

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 in order to establish what condition is 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, a utility may 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 Potential Sources of Significant Contamination (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 preservation 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, 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.

Elkins Municipal 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 5** and in **Appendix A.**

Table 5. 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?	Yes. They regularly receive notification emails from the WV Bureau for Public Health regarding spills in the region. They have also received notifications from upstream utilities like Beverly.
Are you aware of any facilities, land uses, or critical areas within your protection areas where chemical contaminants could be released or spilled?	Yes. The highest priority potential sources of significant contamination are agriculture and roadways in the watershed. The Tygart Valley River passes through several populated counties and agricultural communities before reaching Elkins, and the threat of contamination from either of these sources is high year round.
Are you prepared to detect potential contaminants if notified of a spill?	Yes. The operators can collect grab samples of the raw water to test for contaminants if notified of a spill. For advanced testing, they would have to send the samples off to a lab.

List laboratories (and contact information) on whom you would rely to analyze water samples in case of a reported spill.	**Laboratories**			
	Name		**Contact**	
	Reliance Laboratories- Bridgeport, WV		304-842-5285 RelianceLabs@wvdsl.net	
	REIC Laboratory- Beaver, WV		800-999-0105, 304-255-2500, info@reiclabs.com	
	Clarksburg Water Board-Clarksburg, WV		304-642-5467	
Do you have an understanding of baseline or normal conditions for your source water quality that accounts for seasonal fluctuations?	Yes. Through daily raw water sampling and observations, utility staff has established an understanding of baseline water conditions, and would be able to recognize a sudden change in turbidity or chlorine demand.			
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?	No. See Form B in **Appendix A**.			
Provide or estimate the capital and O&M costs for your proposed early warning monitoring system or upgraded system.	**Monitoring System**	**YSI EXO 2 (B-1)**	**Hach sc1000 (B-2)**	**Real Tech Full Scanning Monitoring System (B-3)**
	Capital	Approximate Capital Cost- $19,000	Approximate Capital Cost- $18,907	Approximate Capital Cost- $24,155
	Yearly O & M	Parts and calibration- Approximately $1000 Data management and telemetry- $1000	Full service contract with Hach Service Representative- $2,258 Online Viewer-$600	Replacement Lamps- $1,480 Smart-Sense Monitoring Service- $499
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			

Single Source Feasibility Study

If a public water utility's water treatment plant is served by a single–source intake in 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 developing 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 in addition to what is currently stored to meet water system design standards, interconnection with neighboring systems, or other options identified on a local level. Note that a secondary intake must draw water supplies from a substantially different location on the same water source, or from an entirely different water source.

To accomplish this requirement, the utility has examined existing and possible alternatives and ranked them by their technical, economic, and environmental feasibility according to the West Virginia Department of Health and Human Resources Bureau for Public Health (WVBPH) 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, the utility has documented the process used to examine the feasibility of each alternative, and has generated scores that compare the alternatives. The completed Feasibility Study Matrix is attached as **Appendix B**.

In addition to the Feasibility Study Matrix spreadsheet, a brief narrative is also included in **Appendix B** that identifies one or more feasible alternative, provides a summary of data used to make this determination, and briefly summarizes the results of the feasibility matrix.

Appendix A. Early Warning Monitoring System

Form B- Proposed Early Warning Monitoring Systems

Elkins Municipal Water

Primary Surface Water Source:

The primary source of raw water for the City of Elkins is the Tygart Valley River. The river is diverted east of town so that the city can choose to block off a section of the stream to isolate the water source from incoming contaminants. The intake is located in this reservoir roughly 100' from the water treatment plant. The raw water pumping station is on the bank across Barron Ave. from the plant. There is a readily available electrical supply, and some of the following suggested early warning monitoring systems could either be housed in the pump station or in the plant itself.

There are many possible solutions for designing and installing an early warning monitoring system. Over time, technology changes and improves and it is difficult to predict the type of equipment that will be useful and effective in the long term. The following plans are for proposed systems that would work for Elkins Municipal Water using current technology and the current plant and intake configuration.

B-1. YSI EXO 2 Monitoring System Proposal
Describe the type of early warning detection equipment that could be installed, including the design.
The YSI EXO 2 Multiport Sonde can accommodate 6 different sensors and has an automatic wiper mechanism to remove biofouling from the sensor tips, which reduces maintenance time. The sonde is built to be resilient and low maintenance, and is capable of providing online water quality monitoring that can be transmitted real time to a designated PC or website that can be accessed by any designated user. The sonde can hold up to 6 sensors, but this plan recommends 4 of the more basic sensors that would be sufficient to detect any sudden shifts in water quality in any West Virginia stream or river. These sensors would include: conductivity/temperature, optical dissolved oxygen, pH, and fluorescent dissolved organic matter (fDOM). The fDOM sensor could potentially detect petroleum products in the water but is not entirely reliable for this purpose. At this time, YSI does not make a sensor for petroleum products for the EXO 2 but likely will in the future, at which time it is recommended that the utility purchase it. Other sensors could be purchased in the future as well if deemed necessary by the utility.
Where would the equipment be located?

The sonde would be attached to an anchor or buoy in the Tygart Valley River. The suggested method of mounting the sonde involves drilling holes in a PVC pipe, capping the end, inserting the sonde and attaching to the buoy or anchor structure using brackets or chains. This will protect the sensor from debris and hide it from view somewhat.

The sonde would be hardwired to the YSI Storm 3 data analysis/telemetry system. The Storm 3 would be located in a monitoring structure that would be built west of Elkins along Georgetown Road. This would give the operators adequate time to react to an alert and close off the reservoir. The unit is contained in a waterproof case and comes with a solar photovoltaic panel capable of powering both the data analysis unit and the sonde, so long as the sonde is hardwired to the Storm 3. The device can be battery powered as well if this is not an option.

What would the maintenance plan for the monitoring equipment entail?

The maintenance plan for the system would involve replacing the dissolved oxygen sensor cap, replacing the pH electrode cap, and purchasing pH, turbidity, and conductivity calibration solution on a yearly basis. The sonde itself is designed to last 5-10 years and should be inspected and calibrated once a month.

In addition, there is a recurring yearly fee associated with the real-time data/telemetry package for managing the website and data analysis.

Describe the proposed sampling plan at the monitoring site.

The sonde can be programmed to take regular measurements at any intervals defined by the operator or user. These measurements can also be taken in bursts, averaged over a period of time, or modified automatically as water quality levels change. Data is stored in the Storm 3 and transmitted to the receiving computer as it is recorded. This information can be transmitted wirelessly via a cellular modem. The cellular transmitter is powerful enough to work even in areas with poor cell reception.

Describe the proposed procedures for data management and analysis.

The Storm 3 package includes data management software that can generate data reports and presentations and allow the user to modify and adjust sampling schedules remotely from the plant.

The sonde can be programmed to alert the user when any of the water quality parameters exceeds a user-defined level. This will allow the operator to program the system to notify them when their previously observed baseline conditions are exceeded in time for them to shut down the pumps and close off the intake. The operator can receive alerts via text message and email at the treatment plant computer or any designated cell phone.

B-2. Hach sc1000 Monitoring System Proposal
Describe the type of early warning detection equipment that could be installed, including the design.
The Hach sc1000 online monitoring system includes a controller, back panel, display module, and trough. Raw water is pumped into the trough from the source where it can be sampled in real time. The probe module can accommodate up to 6 sensors, which means it can monitor up to 6 parameters at once. This plan suggests the following sensors: conductivity, pH, turbidity, and dissolved oxygen. Hach can also supply a sensor to detect oil in water, which would cost an additional $18,414.00 and would possibly be a good investment for any water system if sufficient funds were available. This sensor is not included in the quoted capital cost. There are several other probes for other parameters that are available from Hach, and these could be purchased as deemed necessary by the utility.
Where would the equipment be located?
The sc1000 Controller, back panel, and trough would be located a monitoring structure that would be built along Georgetown Road west of Elkins. A small diameter line would run out from the structure into the river to pull raw water back to the controller where it would flow into the trough for sampling. This option would require the utility to purchase a line or hose long enough to reach the center of the river and a small pump. The line and pump could be fairly low- tech and inexpensive, as the sc1000 only requires a minimum of 900 mL/min. of flow. The controller will be equipped with the MODBUS advanced communications/networking unit, which can transmit readings in real time directly to the SCADA system in the treatment plant to alert the operators in any change in baseline water quality. The sc1000 can either be hardwired to a computer or it can use a cellular modem to transmit the data if there is sufficient cellular signal.
What would the maintenance plan for the monitoring equipment entail?
The maintenance plan for the system would entail a yearly maintenance contract with the manufacturer. A Hach Service Representative would regularly service the monitoring equipment. This service would take care of all parts, labor, and preventative maintenance and would include 2-3 scheduled maintenance visits per year.
Describe the proposed sampling plan at the monitoring site.
The sc1000 monitors the quality of water flowing through the trough in real time, and can transmit this data back to the plant as it is collected. The actual timing of sampling could be determined by the utility.

Describe the proposed procedures for data management and analysis.
It is recommended that the utility purchase the Hach Universal Data Gateway software, which would help to process and analyze the incoming information into easily interpreted reports. The price of this software is included in the rough capital cost.

B-3. Real Tech Full Scanning UV-VIS Monitoring System
Describe the type of early warning detection equipment that could be installed, including the design.
The Real Tech Full Scanning UV-VIS monitoring system provides full ultraviolet/visible scanning for organics and other specific parameters that may indicate a contamination event. The included PC Controller is pre-loaded with the software needed to store and process this information to establish a "normal" or "baseline" set of conditions for the raw water source. In addition to the UV-VIS sensors, the system can accommodate up to 8 additional sensors that are available from a third party and priced separately. This plan includes pricing and details for a system equipped to measure conductivity, pH, temperature, and dissolved oxygen. Other additional sensors could be purchased and added if deemed necessary by the utility.
Where would the equipment be located?
In the case of Elkins Municipal Water, the UV-VIS Full Monitoring System would be located in a new monitoring structure that would be built on the riverbank along Georgetown Road, west of Elkins. A small-diameter line or hose would run from the structure into the river to pull raw water back to the controller where it would flow into the unit for sampling. This option would require the utility to purchase enough line to reach the intake as well as a small pump. The line and pump could be fairly small and inexpensive, as the system only requires a minimum of 300-800 mL/min. of flow. The system also includes the Real Pump Clean System, which provides automatic chemical cleaning of the sensors and reduces maintenance time.
What would the maintenance plan for the monitoring equipment entail?
The maintenance plan for the system would require about 2 hrs/month for scheduled maintenance tasks. It is also recommended that a monthly laboratory reference sample be taken to effectively calibrate the sensors. The Smart-Sense Web Monitoring Service package costs an additional $499/yr., but provides additional support and remote accessibility by Real Tech, and it is recommended. The Deuterium and Tungsten lamps would also need to be replaced every six months at a cost of $740 per set.

Describe the proposed sampling plan at the monitoring site.
The Full Scanning UV-VIS system continuously monitors raw water as it is pumped through the unit, and is capable of establishing baseline conditions that account for seasonal variability, which can help to reduce false alarms.
Describe the proposed procedures for data management and analysis.
The Real Tech monitoring system is capable of communicating with the treatment plant via Modbus, Ethernet, USB, or cell modem. It can be integrated with the treatment plant's SCADA system to provide real-time information about conditions at the intake and provides full remote monitoring. It is also recommended that the utility take advantage of the Smart-Sense Web Monitoring service offered by Real-Tech to analyze and interpret data taken by the monitoring system. This consultation service requires an additional service fee, which is included in this quote.

Appendix B. Single Source Feasibility Study Matrices and Narrative

Single Source Alternatives Feasibility Study

ELKINS PUBLIC WATER SYSTEM

PWSID: WV3304203

TETRA TECH

PURPOSE

This Source Water Alternatives Feasibility Study (the Study) is prepared in accordance with legislative rule 64CSR3. The rule provides for numerous source water protection planning activities. As part of these activities, if a secondary source of water supply is not available, public water systems (PWSs) are required to prepare a study to determine the technical and economic feasibility of the following options to provide continued water service in the event the source water becomes contaminated. The options include:

- Constructing or establishing a secondary or backup intake which would draw water from a substantially different location or water source;
- Constructing additional raw water storage capacity and/or treated water storage capacity to provide at least two days of system storage based on the plant's maximum level of production in the last year;
- Creating or constructing an operational interconnection(s) between the PWS other PWS plants or another PWS to allow the utility to receive its water from a different source of supply;
- Any other alternative which is available to the PWS to secure safe and reliable alternative water supply.

If one or more of the above options is determined to be feasible, the PWS is required to provide additional detail on the costs, risks and benefits of implementing each feasible alternative.

This Study utilizes the matrix provided by the West Virginia Department of Health and Human Resources, Bureau for Public Health to determine the feasibility of the alternatives for the Elkins PWS. The matrix provides a systematic method of evaluating alternatives using numerous factors and a system to rank the economic technical and environmental feasibility of each alternative.

SYSTEM DESCRIPTION

The Elkins PWS provides water service to approximately 10,057 people. The PWS is located in Randolph County and uses an impoundment on the Tygart Valley River as its primary raw water supply. The current capacity of the water treatment plant (WTP) is 5.50 MGD, however, there are plans to construct a new 6.00 MGD facility as soon as funding can be secured. The existing WTP uses coagulation, flocculation, sedimentation, filtration and disinfection to treat the water to potable standards. The proposed WTP will use ultrafiltration for water treatment. **Table 1** below provides a summary of the WTP capacity and recent average day and maximum day demands in the Elkins system.

Table 1. Elkins PWS Capacity and Demands

Parameter	Value
Average Day Demand (ADD) (MGD)(1)	2.058
Maximum Day Demand (MDD) (MGD)(1)	2.839
WTP Capacity (MGD)	5.50 (6.00)(2)
WTP Utilization at Maximum Day Demand	51.2% (47.35)(2)
MDD to ADD Ratio(3)	1.38

(1) For the period April 2014 to March 2015
(2) Values in parentheses refer to the new WTP planned for construction
(3) Calculated using Maximum Daily Demand (MDD)/Average Daily Demand (ADD) Ratio

Storage in the Elkins PWS consists of two tanks summarized in **Table 2.**

Table 2. Elkins PWS Water Storage

Name	Type	Volume (gallons)
High Street	Ground	1,500,000
McQuain Street(1)	Ground	1,000,000
Crystal Springs(1)	Standpipe	2,000,000
Total		4,500,000
12-Month ADD (MGD)		2.058
Days Storage		2.2 days

(1) The McQuain and Crystal Springs Tanks will be replaced by a new 3.0 MG storage tank when the new WTP is constructed.

On a system-wide basis, Elkins meets the 2 days at average day demand storage requirement and system staff have indicated that they have no problems achieving 20% turnover of the storage volume. All system tanks are filled and empty based on the pressure in the distribution system. In the event of an emergency there would be approximately 2 days of water supply if the tanks were full with the McQuain and High Street tanks emptying first.

ALTERNATIVES

For comparison purposes, this feasibility analysis is focused on evaluating long term source water supply alternatives. Therefore, sizing of the alternatives and cost opinions for this feasibility analysis are based upon the **maximum WTP capacity** to account for changes in demand over time due to population growth or other factors.

Although source water alternatives that are sized for current or short term demands may provide some protection against water shortages, they are not considered as feasible alternatives in the context of this long term planning level analysis. The current maximum daily demand for Elkins Public Water represents 51.2% of the total WTP capacity, so alternatives that are designed to meet maximum daily demand for the short term may be constructed at a lower cost than those provided in this feasibility analysis. However, if considering short term alternatives that meet only current demand, water systems must be prepared to expand those alternatives or identify additional source water alternatives to meet long term demands in the future.

Table 3 below provides the basis for sizing each alternative:

Table 3. Alternatives – Sizing Basis

Alternative	Backup Intake	Raw Storage	Treated Storage	Interconnect
Basis	Max day	2 days of max day demand	2 days of max day demand	Average day
Value	6.00 MGD	12.00 MG	12.00 MG	4.348 MGD[1]

(1) Calculated using Maximum Daily Demand (MDD)/Average Daily Demand (ADD) Ratio.

As stated previously, the feasibility analyses for raw and treated water storage alternatives are expected to consider storage in addition to the existing system volume that is used to meet the average daily demands of the system.

Cost estimates were developed based on a conceptual analysis of each alternative. All costs were reviewed for accuracy and compared with actual costs of similar projects and RSMeans CostWorks 2014. The estimates include materials, installation and contractor's overhead and profit. The estimates are also based on the following assumptions and considerations:

- Piping is priced as mechanical joint ductile iron unless noted otherwise, and includes provisions for road crossings, aerial crossings and site restoration.
- Raw water and treated water storage tanks are priced as steel ground tanks with site work and installation included.
- Pumps are sized and priced based on conceptual level estimates of the required pumping conditions (flow and total dynamic head).
- Precast concrete vaults and metal pump enclosures are sized to house the estimated number of pumps required along with HVAC, electrical, and controls equipment.
- Electrical and controls costs are estimated at 10% of the overall facility costs including pumps.

- Site work is estimated as a lump sum cost based on the approximate size of the disturbed area and other factors that affect level of effort (e.g. whether or not the site is within the 100-yr floodplain).
- Estimates include a 15% engineering allowance and a 30% contingency.
- For purposes of this comparative analysis, costs for land acquisition were estimated at an average of $33,000 per acre. This value was used consistently for each alternative and was selected as an average cost to account for unknown specific site variables (e.g. land and structure values, potential remediation costs, acquisition services, etc.).

All capital costs are annualized over a twenty year period using a 2.5% interest rate and 0.50% closing costs.

O&M cost estimates were developed based on the specific operational requirements for each alternative and include labor and materials. Estimates of power consumption of pumps are based on pump size, number of pumps, and estimated hours of operation. Storage tank O&M estimates assume the exterior and interior are repainted every ten years, the raw water tanks are cleaned annually, and that treated water tanks cleaned every 5 years.

All alternatives developed for Elkins are assumed to be constructed in conjunction with or after the new WTP construction.

Backup Intake on Shavers Fork

The nearest possible alternative source of water supply (on a different water body) is Shavers Fork. Constructing a backup intake would require an intake structure, pump station and 28,500 feet of 24-inch pipe generally following Highway 33. The piping would terminate at the proposed intake structure where the existing intake pumps would transfer the water to the WTP.

Backup Intake on Tygart Valley River

Because several potential contaminant sources in Elkins could impact the existing reservoir on the Tygart Valley River, this alternative would provide for an intake on the river upstream of the diversion canal (reservoir) west of the city. This alternative would allow Elkins to continue to use the river as a water source in the event that the reservoir becomes contaminated. The intake for this alternative would require approximately 11,500 feet of 24-inch pipe.

Interconnection

Elkins PWS is already connected with Beverly Water Works and Huttonsville PSD. However, both systems combined do not have sufficient excess capacity to support Elkins. In addition, both of the systems use either the Tygart Valley River or its tributaries as a water supply and may also be compromised in a contamination event. Other PWSs in the region, including Belington and Buckhannon, are too far away to effectively supply water to Elkins.

Treated Water Storage

The treated water storage alternative includes installing 12 MG of storage at the new WTP site. If this option is implemented it will likely be phased as two 6 MG tanks to more closely match system demands and defer a portion of the cost. Providing treated water storage over and above the required two days ADD presents some operational challenges for the PWS in meeting the 20% daily turnover requirement (§64-77-9.4). With full tanks, the PWS may be faced with having to drain water during periods of low demand to meet the turnover requirement, increasing non-revenue water for the system.

Raw Water Storage

The Elkins PWS already has significant raw water storage in its impoundment of the Tygart Valley River. However, since the impoundment is located in the town there are several contamination sources that could affect the water quality. Therefore, this alternative involves constructing two raw water storage tanks at the new WTP site similar to the treated water storage alternative. The tank would be filled by the new pumps at the intake and would require an additional set of pumps to transfer raw water from the tank to the WTP.

FEASIBILITY DETERMINATION

The attached matrix and sub-schedules (**Tables 4, 5, 6, and 7**) present the feasibility rankings of the alternatives.

A backup intake on Shavers Fork River, raw water storage and a backup intake on Tygart Valley River above the reservoir are considered to be the most feasible alternatives. Although the alternatives may be feasible options, the capital costs are high. The raw water alternative could be phased in gradually, with one tank being constructed with the new WTP and the second tank being constructed as system demands increase.

Table 4. Feasibility Matrix

Alternative Strategy Description	Economic Criteria					Technical Criteria							Environmental Criteria						Final Score	Total Capital Cost	Comments
	Operation and 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	3.0	1.0	**4.0**	**66.7%**	**26.7%**	2.2	3.0	2.3	2.7	**10.2**	**85.0%**	**34.0%**	2.0	3.0	2.0	**7.0**	**77.8%**	**15.6%**	**76.2%**	**$9,978,000**	Intake located on Shavers Fork River
Other- (Backup Intake on Tygart River)	3.0	2.0	**5.0**	**83.3%**	**33.3%**	2.4	3.0	2.3	2.7	**10.4**	**86.7%**	**34.7%**	2.0	3.0	2.3	**7.3**	**81.5%**	**16.3%**	**84.3%**	**$4,700,000**	Intake located on Tygart Valley River upstream of reservoir
Interconnect	0.0	0.0	**0.0**	**0.0%**	**0.0%**	0.0	0.0	0.0	0.0	**0.0**	**0.0%**	**0.0%**	0.0	0.0	0.0	**0.0**	**0.0%**	**0.0%**	**0.0%**	**Alternative is technically infeasible**	There are no PWSs within a 10 mile radius with the capacity to service Elkins. Existing interconnections with Huttonsville and Beverly provide partial service
Treated Water Storage	2.0	1.0	**3.0**	**50.0%**	**20.0%**	1.6	1.5	2.3	3.0	**8.4**	**70.3%**	**28.1%**	3.0	3.0	2.3	**8.3**	**92.6%**	**18.5%**	**66.6%**	**$14,169,000**	Two 6.0 MG ground storage tanks located on new WTP site
Raw Water Storage	2.0	1.0	**3.0**	**50.0%**	**20.0%**	2.4	3.0	2.3	3.0	**10.7**	**89.4%**	**35.8%**	3.0	3.0	2.3	**8.3**	**92.6%**	**18.5%**	**74.3%**	**$14,014,000**	Two 6.0 MG ground storage tanks located on new WTP site

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.

Table 5. Alternatives Table

Criteria	Question	Backup Intake	Feasibility	Interconnect	Feasibility	Treated Water Storage	Feasibility	Raw Water Storage	Feasibility	Other- (Backup Intake on Tygart River)	Feasibility
Economic Criteria											
What is the total current budget year cost to operate and maintain the PWSU (current budget year)?		$1,752,712.00		$1,752,712.00		$1,752,712.00		$1,752,712.00		$1,752,712.00	
O and M Costs	Describe the major O&M cost requirements for the alternative.	Maintenance of pumps and intake structure	3	Alternative is technically infeasible	0	Recurring painting and tank cleaning	2	Electricity, materials, recurring painting and tank cleaning	2	Maintenance of pumps and intake structure	3
	What is the incremental cost ($/gal) to operate and maintain the alternative?	$2,992.00	3	Alternative is technically infeasible	0	$52,186.00	2	$56,346.00	2	$2,486.00	3
	Cost comparison of the incremental O&M cost to the current budgeted costs (%)	0.17%	3	NA	0	2.98%	2	3.21%	2	0.14%	3
O and M-Feasibility Score			***3.0***		***0.0***		***2.0***		***2.0***		***3.0***
Describe the capital improvements required to implement the alternative.		Intake structure and pump station, approximately 28500 feet of 24" pipe		Alternative is technically infeasible		Two 6.0 MG ground storage tanks and transfer pump station		Two 6.0 MG ground storage tanks and transfer pump station		Intake structure and pump station, approximately 11,400 feet of 24" pipe	
Capital Costs	What is the total capital cost for the alternative?	$9,978,000.00	1	Alternative is technically infeasible	0	$14,169,000.00	1	$14,014,000.00	1	$4,700,000.00	2
	What is the annualized capital cost to implement the alternative, including land and easement costs, convenience tap fees, etc. ($/gal)?	$643,000.00	1	Alternative is technically infeasible	0	$913,000.00	1	$903,000.00	1	$303,000.00	2
	Cost comparison of the alternatives annualized capital cost to the current budgeted costs (%).	36.69%	1	Alternative is technically infeasible	0	52.09%	1	51.52%	1	17.29%	2
Capital Cost-Feasibility Score			***1.0***		***0.0***		***1.0***		***1.0***		***2.0***

Table 5. Alternatives Table (Cont'd)

Criteria	Question	Backup Intake	Feasibility	Interconnect	Feasibility	Treated Water Storage	Feasibility	Raw Water Storage	Feasibility	Other- (Backup Intake on Tygart River)	Feasibility
Technical Criteria											
Permitting	Provide a listing of the expected permits required and the permitting agencies involved in their approval.	See Permitting Sub-schedule	2	Alternative is technically infeasible	0	See Permitting Sub-schedule	2	See Permitting Sub-schedule	2	See Permitting Sub-schedule	2
	What is the timeframe for permit approval for each permit?	See Permitting Sub-schedule	2	Alternative is technically infeasible	0	See Permitting Sub-schedule	2	See Permitting Sub-schedule	2	See Permitting Sub-schedule	2
	Describe the major requirements in obtaining the permits (environmental impact studies, public hearings, etc.).	See Permitting Sub-schedule	2	Alternative is technically infeasible	0	See Permitting Sub-schedule	2	See Permitting Sub-schedule	2	See Permitting Sub-schedule	2
	What is the likelihood of successfully obtaining the permits?	No identified barriers	3	Alternative is technically infeasible	0	Potential for non-revenue water issues	1	No identified barriers	3	No identified barriers	3
	Does the implementation of the alternative require regulatory exceptions or variances?	The pump station will be located within the 100 year flood plain.	2	Alternative is technically infeasible	0	In order to avoid flushing water additional studies may be required to support a variance from the 20% turnover rule	1	None Identified	3	None Identified	3
Permitting-Feasibility Score			***2.2***		***0.0***		***1.6***		***2.4***		***2.4***

Table 5. Alternatives Table (Cont'd)

Criteria	Question	Backup Intake	Feasibility	Interconnect	Feasibility	Treated Water Storage	Feasibility	Raw Water Storage	Feasibility	Other- (Backup Intake on Tygart River)	Feasibility
Flexibility	Will the alternative be needed on a regular basis or only used intermittently?	Intermittent	3	Alternative is technically infeasible	0	Full time operations	2	Full time operations; with ability for intermittent	3	Intermittent	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?)	No anticipated changes in treatment or water delivery with the backup source	3	Alternative is technically infeasible	0	With the requirement to turn over 20% of tank volume the system will be required to flush water during days when demands are low.	1	There will be additional operating requirements for the new equipment but the existing treatment process will be minimally affected.	3	No anticipated changes in treatment or water delivery	3
Flexibility-Feasibility Score			***3.0***		***0.0***		***1.5***		***3.0***		***3.0***
Resilience	Will the alternative provide any advantages or disadvantages to meeting seasonal changes in demand?	Shavers Fork has a different watershed and may be less sensitive to seasonal changes	2	Alternative is technically infeasible	0	Yes; only short term	2	Yes; only short term	2	Similar to existing conditions	2
	How resistant will the alternative be to extreme weather conditions such as drought and flooding?	Additional supply from Shavers Fork may increase resistance to drought conditions	2	Alternative is technically infeasible	0	Yes; only short term	2	Yes; only short term	2	Similar to existing conditions	2
	Will the alternative be expandable to meet the growing needs of the service area?	Yes	3	Alternative is technically infeasible	0	Yes	3	Yes	3	Yes	3
Resilience-Feasibility Score			***2.3***		***0.0***		***2.3***		***2.3***		***2.3***

Table 5. Alternatives Table (Cont'd)

Criteria	Question	Backup Intake	Feasibility	Interconnect	Feasibility	Treated Water Storage	Feasibility	Raw Water Storage	Feasibility	Other-(Backup Intake on Tygart River)	Feasibility
Institutional Requirements	Identify any agreements or other legal instruments with governmental entities, private institutions or other PWSU required to implement the alternative.	None identified	3	Alternative is technically infeasible	0	None identified	3	None Identified	3	Agreement with railroad for right-of-way use	2
	Are any development/planning restrictions in place that can act as a barrier to the implementation of the alternative?	None identified	3	Alternative is technically infeasible	0	None identified	3	None Identified	3	None identified	3
	Identify potential land acquisitions and easements requirements.	Easement and/or property purchase for intake and pump station	2	Alternative is technically infeasible	0	None identified	3	None Identified	3	None identified	3
Institutional Requirements-Feasibility Score			***2.7***		***0.0***		***3.0***		***3.0***		***2.7***
Environmental Criteria											
Environmental Impacts	Identify any environmentally protected areas or habitats that might be impacted by the alternative.	Intake, and pump station are likely to require a T&E species survey.	2	Alternative is technically infeasible	0	None identified	3	None Identified	3	Intake, and pump station are likely to require a T&E species survey.	2
Environmental Impacts-Feasibility Score			***2.0***		***0.0***		***3.0***		***3.0***		***2.0***
Aesthetic Impacts	Identify any visual or noise issues caused by the alternative that may affect local land uses?	None Identified	3	Alternative is technically infeasible	0	None Identified	3	None identified	3	None Identified	3
	Identify any mitigation measures that will be required to address aesthetic impacts?	None Identified	3	Alternative is technically infeasible	0	None Identified	3	None identified	3	None Identified	3
Aesthetic Impacts-Feasibility Score			***3.0***		***0.0***		***3.0***		***3.0***		***3.0***

Table 5. Alternatives Table (Cont'd)

Criteria	Question	Backup Intake	Feasibility	Interconnect	Feasibility	Treated Water Storage	Feasibility	Raw Water Storage	Feasibility	Other- (Backup Intake on Tygart River)	Feasibility
Stakeholder Issues	Identify the potential stakeholders affected by the alternative.	See Stakeholder Sub-schedule	2	Alternative is technically infeasible	0	See Stakeholder Sub-schedule	2	See Stakeholder Sub-schedule	2	See Stakeholder Sub-schedule	2
	Identify the potential issues with stakeholders for and against the alternative.	See Stakeholder Sub-schedule	2	Alternative is technically infeasible	0	See Stakeholder Sub-schedule	2	See Stakeholder Sub-schedule	2	See Stakeholder Sub-schedule	2
	Will stakeholder concerns represent a significant barrier to implementation (or assistance) of the alternative?	Possibility from an environmental perspective	2	Alternative is technically infeasible	0	None Identified	3	None Identified	3	None Identified	3
Stakeholder Issues-Feasibility Score			***2.0***		***0.0***		***2.3***		***2.3***		***2.3***
Comments		Intake located on Shavers Fork River		There are no PWSs within a 10 mile radius with the capacity to service Elkins. Existing interconnections with Huttonsville and Beverly provide partial service		Two 6.0 MG ground storage tanks located on new WTP site		Two 6.0 MG ground storage tanks located on new WTP site		Intake located on Tygart Valley River upstream of reservoir	

Table 6. Permitting Sub-Schedule

Permits Required							
Agency	**Permit**	**Backup Intake**	**Interconnect**	**Treated Water Storage**	**Raw Water Storage**	**Back up Intake on Tygart River**	**Notes**
WV Bureau Public Health	Construction	yes	NA	yes	yes	yes	
USACOE[1]	404 Permit	yes	NA	no	no	yes	
Local/State Road Agency	ROW Utilization	yes	NA	no	no	yes	

(1) US Army Corps of Engineers

Application Period Duration							
Agency	**Permit**	**Backup Intake**	**Interconnect**	**Treated Water Storage**	**Raw Water Storage**	**Back up Intake on Tygart River**	**Notes**
WV Bureau Public Health	Construction	90 days	NA	90 days	90 days	90 days	
USACOE	404 Permit	180 days	NA	NA	NA	180 days	
Local/State Road Agency	ROW Utilization	90 days	NA	NA	NA	90 days	

Application Duration							
Agency	**Permit**	**Backup Intake**	**Interconnect**	**Treated Water Storage**	**Raw Water Storage**	**Back up Intake on Tygart River**	**Notes**
WV Bureau Public Health	Construction	Engineers Report; Construction Drawings; Specifications	NA	Engineers Report; Construction Drawings; Specifications	Engineers Report; Construction Drawings; Specifications	Engineers Report; Construction Drawings; Specifications	
USACOE	404 Permit	Construction Drawings; Construction Plan	NA	NA	NA	Construction Drawings; Construction Plan	
Local/State Road Agency	ROW Utilization	Construction Drawings	NA	NA	NA	Construction Drawings	

Other Considerations							
Agency	**Permit**	**Backup Intake**	**Interconnect**	**Treated Water Storage**	**Raw Water Storage**	**Back up Intake on Tygart River**	**Notes**
WV Bureau Public Health	Construction						
USACOE	404 Permit						
Local/State Road Agency	ROW Utilization						

Table 7. Stakeholders Sub-Schedule

List of Concerns for Each Alternative by Stakeholder						
Stakeholder Group	**Backup Intake**	**Interconnect**	**Treated Water Storage**	**Raw Water Storage**	**Back up Intake on Tygart River**	**Notes**
Residential Customers	Cost impacts; improved protection from contamination	Minor	Aesthetic concerns; cost impacts; Improved protection from contamination	Aesthetic concerns; cost impacts; Improved protection from contamination	Cost impacts; Improved protection from contamination	Neutral response overall; negative response to cost impacts
System Owner	Additional operations; cost impacts	Minor	Operational issue with storage turnover; Cost impacts	Additional operations; Cost impacts	Additional operations; Cost impacts	Positive to meet regulations and improve service; Negative for treated water storage
Industrial/Commercial Customers	Cost impacts; Improved service and protection from contamination	Minor	Cost impacts; Improved service and protection from contamination	Cost impacts; Improved service and protection from contamination	Cost impacts; Improved service and protection from contamination	Neutral to positive response; less sensitive to costs over improved service
Environmental Interest Groups	Aesthetic and development impact concerns near a Wildlife Management Area	Minor	Minor	Minor	Minor	Increased involvement in the planning and design process

CONCLUSION

Based on the analysis and findings presented Tetra Tech has the following conclusions:

1. The existing storage in the Elkins PWS exceeds the 2 day minimum requirement. If the WTP was offline and the tanks were full there would be approximately 2.2 days of water supply for the service area.

2. Based on the scoring system, a backup intake on Shavers Fork River, raw water storage, and a backup intake on the Tygart Valley River are considered the most feasible alternatives. The raw water storage alternative could be constructed in phases to reduce the initial capital cost. **Figures 1 through 3** and **Tables 8 through 13** provide additional details of these alternatives.

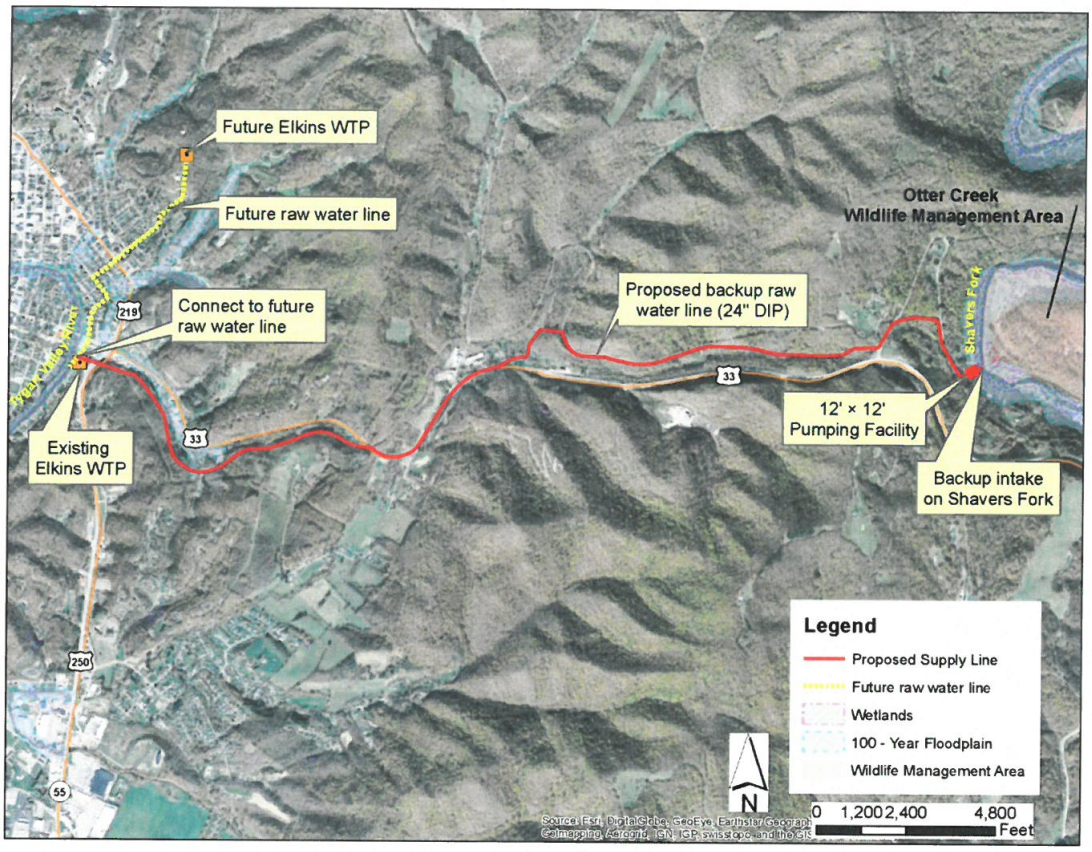

Figure 1. Backup Intake on Shavers Fork – Conceptual Schematic

Table 8. Backup Intake – Operations and Maintenance Cost

Operations and Maintenance Cost						
Item	**Quantity**	**Unit**	**Unit Cost**	**Subtotal**	**Period**	**Annual Cost**
Labor	24	Hr	$40.00	$960.00	Per year	$960.00
Power Consumption	36	Hr	$31.71	$1,141.38	Per year	$1,141.38
Materials (Pump Grease)	1	LS	$200.00	$200.00	Per year	$200.00
			Sub-Total Annual O&M			**$2,301.38**
			Contingency @ 30%			$690.41
			Total Annual O&M			**$2,991.79**

Table 9. Backup Intake – Opinion of Capital Cost

Facility Description/Capital Cost				
Item	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Intake Screen 24"	1	ea	$4,000	$4,000
Intake Piping - 24" RCP	50	ft	$178	$8,900
Piping to Plant - 24" DIP	28,490	ft	$214	$6,096,860
Raw Water Intake Pumps	3	ea	$130,000	$390,000
Pre-Cast Vault for Raw Water Pump Station	1	ea	$120,000	$120,000
Electrical and Controls	1	LS	10% Pump Station Costs	$51,000
Sluice Gate	1	ea	$20,000	$20,000
Site Work	1	LS	$120,000	$120,000
		Sub-Total		**$6,810,760**
		Contingency @ 30%		$2,043,228
		Eng. Permit, etc. @ 15%		$1,021,614
		Land Acquisition		$102,140
		Total Capital Costs		**$9,977,742**

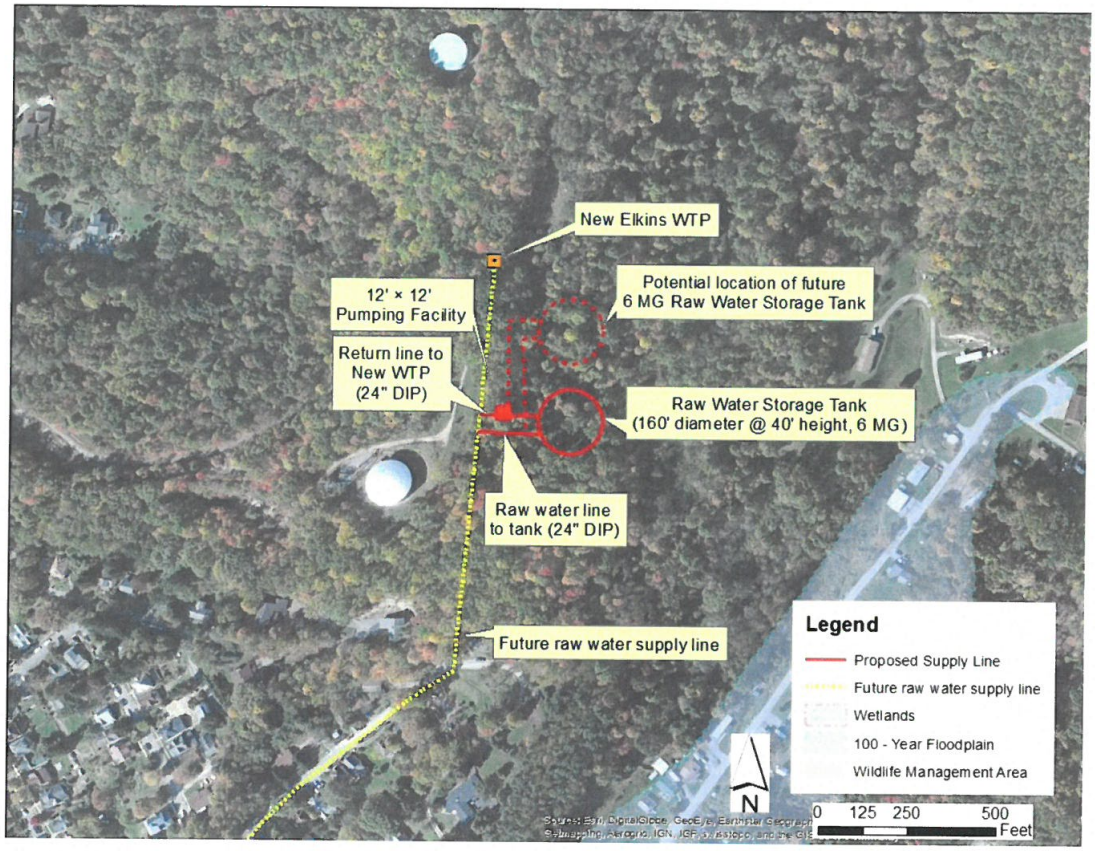

Figure 2. Raw Water Storage – Conceptual Schematic

Table 10. Raw Water Storage – Operations and Maintenance Cost

Operations and Maintenance Cost						
Item	**Quantity**	**Unit**	**Unit Cost**	**Subtotal**	**Period**	**Annual Cost**
Epoxy Painting – Interior Coating	40,400	SF	$4.00	$161,600.00	10 years	$16,160.00
Epoxy Painting – Exterior Coating	40,400	SF	$2.00	$80,800.00	10 years	$8,080.00
Labor	184	Hr	$40.00	$7,360.00	Per year	$7,360.00
Power Consumption (Transfer Pumps)	3,424	Hr	$3.36	$11,493.36	Per year	$11,493.36
Materials (Pump Grease)	1	LS	$250.00	$250.00	Per year	$250.00
			Sub-Total Annual O&M			**$43,343.36**
			Contingency @ 30%			$13,003.01
			Total Annual O&M			**$56,346.37**

Table 11. Raw Water Storage – Opinion of Capital Cost

Facility Description/Capital Cost				
Item	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Raw Water Ground Storage Tank (6 MG)	2	ea	$4,560,750	$9,121,500
Transfer Pumps to WTP	3	ea	$30,000	$90,000
Pre-fab Metal Pump Enclosure	1	ea	$60,000	$60,000
Electrical and Controls	1	LS	10% Pump Station Costs	$15,000
Piping, 24" DIP	600	FT	$214	$128,400
Site Work	1	LS	$250,000	$250,000
	Sub-Total			**$9,664,900**
	Contingency @ 30%			$2,899,470
	Eng. Permit, etc. @ 15%			$1,449,735
	Land Acquisition			$0
	Total Raw Water Tank Capital Costs			**$14,014,105**

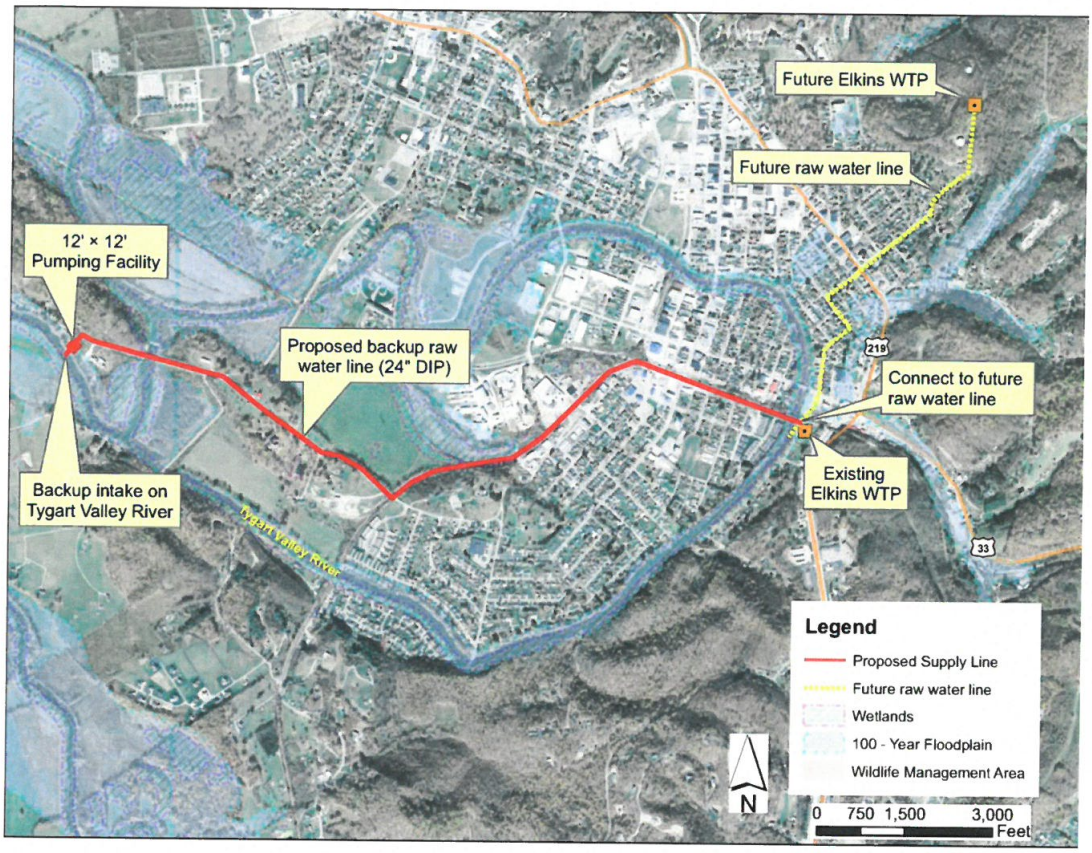

Figure 3. Backup Intake on Tygart Valley River – Conceptual Schematic

Table 12. Backup Intake on Tygart Valley River – Operations and Maintenance Cost

Operations and Maintenance Cost						
Item	**Quantity**	**Unit**	**Unit Cost**	**Subtotal**	**Period**	**Annual Cost**
Labor	24	Hr	$40.00	$960.00	Per year	$960.00
Power Consumption	36	Hr	$20.89	$751.97	Per year	$751.97
Materials (Pump Grease)	1	LS	$200.00	$200.00	Per year	$200.00
			Sub-Total Annual O&M			**$1,911.97**
			Contingency @ 30%			$573.59
			Total Annual O&M			**$2,485.56**

Table 13. Backup Intake on Tygart Valley River – Opinion of Capital Cost

Facility Description/Capital Cost				
Item	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Intake Screen	1	ea	$4,000	$4,000
Intake Piping - 24" RCP	50	FT	$178	$8,900
Piping to plant - 24" DIP	10,550	FT	$214	$2,257,700
Directional Drill Under River	800	FT	$350	$280,000
Raw Water Intake Pumps	3	ea	$120,000	$360,000
Pre-Cast Vault for raw water pump station	1	ea	$120,000	$120,000
Electrical and Controls	1	LS	10% Pump Station Costs	$48,000
Sluice Gate	1	ea	$20,000	$20,000
Site Work	1	LS	$120,000	$120,000
	Sub-Total			**$3,218,600**
	Contingency @ 30%			$965,580
	Eng. Permit, etc. @ 15%			$482,790
	Land Acquisition			$33,000
	Total Backup Intake on Tygart Valley River Capital Costs			**$4,699,970**

Matrix Document

Table 4. Feasibility Matrix

Alternative Strategy Description	Economic Criteria					Technical Criteria							Environmental Criteria						Final Score	Total Capital Cost	Comments
	Operation and 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	3.0	1.0	**4.0**	**66.7%**	**26.7%**	2.2	3.0	2.3	2.7	**10.2**	**85.0%**	**34.0%**	2.0	3.0	2.0	**7.0**	**77.8%**	**15.6%**	**76.2%**	**$9,978,000**	Intake located on Shavers Fork River
Other- (Backup Intake on Tygart River)	3.0	2.0	**5.0**	**83.3%**	**33.3%**	2.4	3.0	2.3	2.7	**10.4**	**86.7%**	**34.7%**	2.0	3.0	2.3	**7.3**	**81.5%**	**16.3%**	**84.3%**	**$4,700,000**	Intake located on Tygart Valley River upstream of reservoir
Interconnect	0.0	0.0	**0.0**	**0.0%**	**0.0%**	0.0	0.0	0.0	0.0	**0.0**	**0.0%**	**0.0%**	0.0	0.0	0.0	**0.0**	**0.0%**	**0.0%**	**0.0%**	**Alternative is technically infeasible**	There are no PWSs within a 10 mile radius with the capacity to service Elkins. Existing interconnections with Huttonsville and Beverly provide partial service
Treated Water Storage	2.0	1.0	**3.0**	**50.0%**	**20.0%**	1.6	1.5	2.3	3.0	**8.4**	**70.3%**	**28.1%**	3.0	3.0	2.3	**8.3**	**92.6%**	**18.5%**	**66.6%**	**$14,169,000**	Two 6.0 MG ground storage tanks located on new WTP site
Raw Water Storage	2.0	1.0	**3.0**	**50.0%**	**20.0%**	2.4	3.0	2.3	3.0	**10.7**	**89.4%**	**35.8%**	3.0	3.0	2.3	**8.3**	**92.6%**	**18.5%**	**74.3%**	**$14,014,000**	Two 6.0 MG ground storage tanks located on new WTP site

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.

TETRA TECH

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December 2015

APPENDIX E. SUPPORTING DOCUMENTATION