# Source Water Protection Plan GREEN VALLEY GLENWOOD PSD -GLENWOOD

PWSID 3302849

Mercer County

April 2016

Prepared by:

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

In cooperation with Green Valley Glenwood PSD



This page is intentionally blank.

John Beckeman					
Preparer's Name					
Source Water Specialist					
Title of Preparer					
Tetra Tech, Inc.					
Name of Contractor(s)/Consultant(s)					
I certify the information in the source water protection plan is complete and accurate to the best of my					
knowledge.					
Signature of responsible party or designee authorized to sign for water utility:					
Signature of responsible party or designee authorized to sign for water utility:					
MARTY MARIOTT:  Print Name of Authorizing Signatory (see instructions):					
Print Name of Authorizing Signatory (see instructions):					
GENERAL MANAGER Title of Authorizing Signatory:					
Title of Authorizing Signatory:					
Date of Submission (mm/dd/yyyy):					

This page is intentionally blank.



# **TABLE OF CONTENTS**

1.0 PURPOSE	1
1.1 What are the benefits of preparing a Source Water Protection Plan?	1
2.0 BACKGROUND: WV SOURCE WATER ASSESSMENT AND PROTECTION PROGRAM	2
3.0 STATE REGULATORY REQUIREMENTS	3
4.0 SYSTEM INFORMATION	4
5.0 WATER TREATMENT AND STORAGE	5
6.0 DELINEATIONS	7
7.0 PROTECTION TEAM	9
8.0 POTENTIAL SOURCES OF SIGNIFICANT CONTAMINATION	11
8.1 Confidentiality of PSSCs	11
8.2 Local and Regional PSSCs	11
8.3 Prioritization of Threats and Management Strategies	
9.0 IMPLEMENTATION PLAN FOR MANAGEMENT STRATEGIES	14
10.0 EDUCATION AND OUTREACH STRATEGIES	20
11.0 CONTINGENCY PLAN	23
11.1 Response Networks and Communication	23
11.2 Operation During Loss of Power	24
11.3 Future Water Supply Needs	25
11.4 Water Loss Calculation	
11.5 Early Warning Monitoring System	
12.0 SINGLE SOURCE FEASIBILITY STUDY	
13.0 COMMUNICATION PLAN	
14.0 EMERGENCY RESPONSE	31
15.0 CONCLUSION	32



# **LIST OF TABLES**

Table 1. Population Served by Green Valley Glenwood PSD - Glenwood	4
Table 2. Green Valley Glenwood PSD - Glenwood Water Treatment Information	5
Table 3. Green Valley Glenwood PSD - Glenwood Surface Water Sources	6
Table 4. Green Valley Glenwood PSD - Glenwood Groundwater Sources	6
Table 5. Watershed Delineation Information	8
Table 6. Protection Team Member and Contact Information	10
Table 7. Locally Identified Potential Sources of Significant Contamination	12
Table 8. Priority PSSCs or Critical Areas	15
Table 9. Priority PSSC Management Strategies	16
Table 10. Education and Outreach Implementation Plan	21
Table 11. Green Valley Glenwood PSD - Glenwood Water Shortage Response Capability	23
Table 12. Generator Capacity	24
Table 13. Future Water Supply Needs for Green Valley Glenwood PSD - Glenwood	25
Table 14. Water Loss Information	26
Table 15. Early Warning Monitoring System Capabilities	27

# **APPENDICES**

Appendix A. Figures

Appendix B. Early Warning Monitoring System Forms

Appendix C. Communication Plan Template

Appendix D. Single Source Feasibility Study

Appendix E. Supporting Documentation

## 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

**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 Green Valley Glenwood PSD - Glenwood 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, Green Valley Glenwood PSD - Glenwood 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.

1

# 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 Green Valley Glenwood PSD - Glenwood 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.

3

# **4.0 SYSTEM INFORMATION**

Green Valley Glenwood PSD - Glenwood 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 Green Valley Glenwood PSD - Glenwood

Administrative office location:			nysical) 2387 Maple Acres 24739 (Mailing) P.O. Box 6099 Blu		
Is the system a public utility, according to the Public Service Commission rule?			Yes		
Date of Most Recent Source Water Assessment Report:			April 2003	3	
Date of Most Recent Source Water Protection Plan:		May 2011			
Population served directly:			5,775		
	System Name		PWSID Number	Population	
Bulk Water Purchaser	N/A		-	-	
Systems:	Systems:		-	-	
Total Population Served by the Utility:		5,775			
Does the utility have multiple source water protection areas (SWPAs)?			Yes		
How many SWP	As does the utility have?		2		



# **5.0 WATER TREATMENT AND STORAGE**

As required, Green Valley Glenwood PSD - Glenwood 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 Green Valley Glenwood PSD - Glenwood 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. Green Valley Glenwood PSD - Glenwood Water Treatment Information

Water Treatment Processes (List All Processes in Order)	Aeration, coagulation, sedimentation, chlorination, and fluoridation
Current Treatment Capacity (gal/day)	876,000
Current Average Production (gal/day)	550,000
Maximum Quantity Treated and Produced (gal)	876,000
Minimum Quantity Treated and Produced (gal)	500,000
Average Hours of Operation	14.5
Maximum Hours of Operation in One Day	24
Minimum Hours of Operation in One Day	0
Number of Storage Tanks Maintained	4
Total Gallons of Treated Water Storage (gal)	652,000
Total Gallons of Raw Water Storage (gal)	94,000,700

5



Table 3. Green Valley Glenwood PSD - Glenwood Surface Water Sources

Intake Name	SDWIS#	Local Name	Describe Intake	Name of Water Source	Date Constructed / Modified	Frequency of Use (Primary/ Backup/ Emergency)	Activity Status (Active/ Inactive)
Green Valley Glenwood PSD - Glenwood	IN001	Green Valley Glenwood PSD - Glenwood	Gravity feed with screen to raw water pump station	Glenwood Reservoir	1984	Primary	Active

Table 4. Green Valley Glenwood PSD - Glenwood Groundwater Sources

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

6

# **6.0 DELINEATIONS**

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

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

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

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

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

7



**Table 5. Watershed Delineation Information** 

Size of WSDA (Indicate units)	11 square miles (7,025 acres)
River Watershed Name (8-digit HUC)	Upper New River Watershed (05050002)
Size of Zone of Critical Concern (Acres)	3,733 acres
Size of Zone of Peripheral Concern (Acres)	3,733 acres
(Include ZCC area)	
Method of Delineation for Groundwater Sources	N/A
Area of Wellhead Protection Area (Acres)	N/A

## 7.0 PROTECTION TEAM

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

The administrative contact for Green Valley Glenwood PSD 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.

Green Valley Glenwood PSD 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.** 

9



**Table 6. Protection Team Member and Contact Information** 

Name	Representing	Title	Phone Number	Email
Marty Mariotti	General Manager- Green Valley/Glenwood PSD	Utility Administrative Contact/Manager	304-325-6832	mmgmpsd@citlink.net
Doug Taylor	Green Valley/Glenwood PSD	Plant Manager	304-425-5678	doug_taylor70@hotmail.com
Tim Farley	Mercer County Emergency Services	Emergency Management Director		mercountyOEM@hotmail.com
David Thompson	Green Valley Fire Department	Fire Chief		
Carl Carter	Mercer County Health Department	Sanitarian	304-324-8367	Carl.T.Carter@wv.gov
Date of first p	protection Team Meeting		September 17, 2015	
(public, local governme local health department	and engage local stakeholders ent, local emergency planners, t, and affected residents) and ommended stakeholders:	A public meeting was held Febr regularly scheduled PSD board notice posted at the PSD office advance of the meeting date. A presented, and comments were included in Appendix E.	meeting. The public wand in a newspaper acsummary of the source	vas invited to attend through a dvertisement published in se water protection plan was

## 8.0 POTENTIAL SOURCES OF SIGNIFICANT CONTAMINATION

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

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

### 8.1 CONFIDENTIALITY OF PSSCS

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

PSSC data from some agencies (ex. WVDHSEM, WVDEP, etc.) may be restricted due to the sensitive nature of the data. Locational data will be provided to the public water utility. However, to obtain specific details regarding contaminants, (such as information included in Tier II reports), water utilities should contact the local emergency planning commission (LEPC) or agencies, directly. Maps and lists of the PSSCs and regulated site locations are provided in **Appendix A. Figures**.

#### 8.2 LOCAL AND REGIONAL PSSCS

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

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

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



# **Table 7. Locally Identified Potential Sources of Significant Contamination**

PSSC Number	Map Code	Site Name	Site Description	Relative Risk Score	Comments
2	M-15	County Park at Glenwood Reservoir	County park where visitors feed resident Canada Geese.	Low	Canada Geese are a source of bacteria.  Need to find a way to legally eliminate geese. Stopping people from feeding geese is impossible.

### 8.3 PRIORITIZATION OF THREATS AND MANAGEMENT STRATEGIES

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

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

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

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



## 9.0 IMPLEMENTATION PLAN FOR MANAGEMENT STRATEGIES

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

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

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

# **Table 8. Priority PSSCs or Critical Areas**

PSSC or Critical Area	Priority Number	Reason for Concern
Highway	1	State Route 20, traverses the SWPA, as do secondary streets. Ice removal, right-of-way maintenance, and spills due to traffic accidents could all potentially contaminate the surface water.
Recreational Uses of the Reservoir	2	Mercer County owns Glenwood Lake and operates a park, open to the public for fishing, paddle boating, and picnicking. Solid waste can contaminate the water source. Another potential source of animal waste in the water is from a large flock of Canada geese that use the reservoir.
		In addition to these threats, Glenwood Lake is only about 10 feet deep. Because it is shallow, the water system has taste and odor issues associated with algae in the summer. The reservoir was dredged before, but sedimentation filled the lake back in.
Agricultural Land Use/Greenhouses	3	Pesticides and other chemicals used for farm operations and greenhouses can migrate into the water supply. Areas used for disposal of animal waste or burying dead livestock can also cause contamination of the source water. Currently, the only livestock farming operations are far upstream in the watershed, on hills outside the ZCC.
Concentrated Residential Area.	4	Several residences exist in the SWPA. Residents' activities in and outside of their home, such as handling and disposal of paints, thinners, cleaners, and automotive fluids, application of fertilizers and pesticides, use of potable water to irrigate, etc. can impact the surface water.
Public Wastewater System and Private Septic Systems	5	Green Valley Glenwood PSD operates a public wastewater treatment facility below the reservoir The groundwater source is no longer being used, so the public wastewater treatment facility is no longer a threat.
		There are private individual septic systems and public wastewater collection lines located in or near the surface water SWPA. Public sewer extends to Glenwood Reservoir. However, homes in the watershed upstream of the reservoir are not served by public sewer. Accidental releases or line breaks may allow untreated sewage to contaminate the surface water source. Untreated sewage contains total coliform, particularly <i>E. coli</i> , along with other bacteria and parasites that could negatively impact human health if treatment processes are not adjusted to address the contamination.



PSSC or Critical Area	Priority Number	Reason for Concern
		Failing private septic systems can leach into surrounding soils or run off into surface water and potentially contaminate the water supply.
Gas Stations, Auto Salvage Yards and Underground Storage Tanks (USTs)	6	Oils, antifreeze, and other automobile fluids can cause contamination of groundwater sources if not cleaned up and disposed of properly.  USTs, particularly those at historic sites, may leak and contaminate groundwater sources.
		The former Marathon Station is no longer in business. The tanks have been pulled, according to PSD staff.

**Table 9. Priority PSSC Management Strategies** 

PSSC or Critical Area	Management Activity	Responsible Protection Team Member Status/		Comments	Estimated Cost
Previous Plan Status	There were 10 management strategies recommended in the existing plan. Two of these strategies have been accomplished. Nine of these are ongoing or continue to be a concern. These are incorporated in this plan update and listed below.	-	-	-	-
Source Water Protection Area	The utility is required to update the Source Water Protection Plan at least every 3 years and continue to monitor any ongoing or new activities that occur in the watershed.	Green Valley Glenwood PSD Protection Team	Ongoing every 3 years. Next update in 2018	-	-
Existing Threats to Water Quality and Quantity	Green Valley Glenwood PSD is in the process of securing funding and an agreement with the City of Princeton to purchase the Dan Hale Reservoir, just	PSD board member or staff and/or operator	Ongoing process.	-	Ongoing studies to determine funding. This will be through grants/loans to the

	upstream of Glenwood Lake. It is surrounded by protected forested lands owned by the City.  Note: No PSSCs occur in its ZCC, thus purchasing this reservoir would provide Green Valley-Glenwood PSD with a protected source of water. The source would supply enough water to discontinue use of the Glenwood Lake, as well as James P. Bailey Lake at their Bulltail Facility.				PSD and will include a raw water line installation to bypass Glenwood Lake.
Highway	Contact the highway maintenance garage to determine the herbicides used within the ROW and any other chemicals used. Communicate the boundaries of the SWPA to raise awareness with utility company to ensure BMPs when applying pesticides or de-icing the roadways.  Note: Herbicide labeling is developed with guidance from the USEPA providing information on application. This guidance has been developed with public health in mind and may list restrictions for application to prevent herbicide migration into water supplies.	PSD board member or staff and/or operator	As needed	-	Minimal cost associated with staff time.
Highway	Coordinate with local/county emergency responders to prepare for accidents along State Route 20 to ensure that spills are contained and cleanup to protect the source water, and that the water facility is notified during an incident.	PSD board member or staff and/or operator	When possible	PSD coordination with Fire Department and Emergency Management is ongoing.	Minimal cost associated with staff time.
Recreational Uses of the Reservoir	Mercer County maintains the picnic areas surrounding Glenwood Lake and keeps them clear from solid waste.	PSD board member or staff and/or operator	Ongoing	PSD communicates regularly with Mercer County park management.	Minimal cost associated with staff time.
Agricultural Land Use/Greenhouses	Contact farmers in the watershed to communicate the SWPA boundaries. Provide copies of fact sheets covering BMPs for nutrient management, pesticide	PSD board member or staff and/or operator	As needed	Livestock operations exist in the watershed but not within the ZCC. The goat farm that	Minimal cost associated with staff time.



	use, pest management, waste oil disposal, safe chemical handling and/or safe chemical storage.			was a concern in the past is no longer in operation.	
Concentrated Residential Area	Work with Mercer County personnel to find ways to discourage the use of the Glenwood Lake by the Canada geese. Deterrent activities work best if performed when birds first arrive to the reservoir. Contact the WVDNR for more information on protection for the birds as well as techniques to control their use of the water source.  Note: Mercer County is served by the WVDNR District 4 office. Contact: Division of Natural Resources, 2006 Robert C. Byrd Drive, Beckley, WV 25801-8320, phone: (304) 256-6947.	PSD board member or staff and/or operator	As needed	Call Todd Dowdy at WVDNR District 4 office (304) 256- 6947 or email todd.j.dowdy@wv.gov for an update on geese.	Minimal cost associated with staff time.
Concentrated Residential Area	Raise residents' awareness of the source water.  Note: Refer to the Education and Outreach Strategies below for activities.	PSD board member or staff and/or operator	As needed	-	See below.
Public Wastewater System and Private Septic Systems	The Green Valley Glenwood PSD wastewater staff are familiar with the SWPAs for the water system.  The Green Valley Glenwood PSD is constantly considering extending wastewater services to unserved areas and has considered those in the SWPA, but are unable to secure funding at this time. The PSD will send a message to water customers, who have private septic systems via their water bill. The message will remind them to have their septic systems inspected and pumped regularly to protect their drinking water source.	PSD board member or staff and/or operator	Ongoing coordination with wastewater staff	-	Depending upon the size, a project to extend wastewater services can range from tens of thousands to millions of dollars.
Gas Stations, Auto Salvage Yards and Underground	Communicate with station and salvage yard owners the need for them to properly institute BMPs to contain and clean up spills. Monitor compliance with state environmental regulations. Provide owners or	PSD board member or staff and/or operator	As needed	-	Minimal cost associated with staff time.

Storage Tanks (USTs)	operators with copies of material on underground storage tank maintenance.		
	Note: Consider whether operating or historic stations and shops are compliant with rules regarding USTs and leaking underground storage tanks (LUSTs). If you suspect an issue with an UST or LUST, contact the WVDEP at (304)926-0499 and ask for the Underground Storage Tank Staff for an inspection.		

## 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. Green Valley Glenwood PSD 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
Consumer Confidence Report	Include info on source water protection plan in CCR.  Note: This would be in addition to required Source Water Assessment information, including source of water and susceptibility to contamination.	PSD board member or staff and/or operator	Annually	CCR is published on the Green Valley Glenwood PSD website once per year.	CCR required by SDWA, included in annual budget.
Brochures, pamphlets, and letters	Send public letters and/or brochures to educate on what they can do to protect and conserve source water.  Note: Brochure is included in Appendix E. Funding may be available through the grant program. Development of other outreach material may be delegated to a volunteer with appropriate skills.	PSD board member or staff and/or operator	As needed	The PSD does not currently produce letters or brochures other than the CCR. However, additional information could be posted to the PSD website.	Cost in brochure printing and mailing.
School Curricula	Coordinate with educators to include source water protection information in school curricula.  Note: Operator will initiate effort, locate the appropriate individuals in school and/or on local school board. Can provide websites with free education materials to promote source water protection and conservation.  Also operator may visit school or invite students for a plant tour to tie in with classroom materials.	PSD board member or staff and/or operator	As requested	-	Minimal costs. Would require time to coordinate, visit classroom and provide tour.



Plant Tours	Conduct plant tours for emergency responders, students, and interest groups.	PSD board member or staff and/or operator	Ongoing – as requested	Plant tours occur regularly several times per year. Students from Glenwood School System (K-8) and Ceres Elementary (K-5) have taken tours.	Minimal cost associated with operator's time.
Emergency Planning and Coordination	Participate in Emergency Planning and Coordination.	PSD board member or staff and/or operator	Ongoing	PSD and Mercer County Emergency Management staff communicate regularly.	Cost associated with participation in training activities.
Partner with Watershed Association	Partner with Watershed Association.  Note: Watershed Associations have monthly meetings and conduct public outreach on a yearly basis.	PSD board member or staff and/or operator	If available	According to the WVDEP, there are no watershed associations serving Brush Creek, Bluestone, or the Upper New River.	Cost associated with participation in activities.
Public Meeting	Conduct Public Meeting.	PSD board member or staff and/or operator	In future if needed	The PSD conducts regular business meetings at 1 pm on the 2 <sup>nd</sup> and 4 <sup>th</sup> Thursdays of each month. These meetings are open to the public.	Minimal cost related to operator time.
Media Campaign	Post source water and drinking water facts on public access television.  Note: Information can be run at different times of the year (ex. focus on fertilizer contamination in spring/summer).	PSD board member or staff and/or operator	As needed	A media campaign would be conducted in case of emergency.	The ad for public access television should be free, so the cost would just be the time to prepare the information.

## 11.0 CONTINGENCY PLAN

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

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

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

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

#### 11.1 RESPONSE NETWORKS AND COMMUNICATION

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

Table 11. Green Valley Glenwood PSD - Glenwood Water Shortage Response Capability

Can the utility isolate or divert contamination from the intake or groundwater supply?	No
Describe the utility's capability to isolate or divert potential contaminants:	N/A
Can the utility switch to an alternative water source or intake that can supply full capacity at any time?	Yes



Describe in detail the utility's capability to switch to an alternative source:	Glenwood water system can switch to the WVAWC Bluefield Systems and Bluewell PSD by closing gate valves.		
Can the utility close the water intake to prevent contamination from entering the water supply?	Yes		
How long can the intake stay closed?	The intake can stay closed as long as WVAWC Bluefield can supply water. (See Note Below)		
Describe the process to close the intake:	Closing gate valves		
Describe the treated water storage capacity of the water system:	Four storage tanks totaling 652,000 gallons of treated water storage.		
Is the utility a member of WVRWA Emergency Response Team?	Yes		
Is the utility a member of WV-WARN?	Yes		
List any other mutual aid agreements to provide or receive assistance in the event of an emergency:	Interconnection with the WVAWC Bluefield		

Information for this table was taken from the Source Water Protection Contingency Plan prepared by The Thrasher Group. The complete report is provided as Appendix D.

## 11.2 OPERATION DURING LOSS OF POWER

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

**Table 12. Generator Capacity** 

What is the type and capacity of the generator needed to operate during a loss of power?	800 kW stationary or with a 1200A automatic transfer switch.
Can the utility connect to generator at intake/wellhead? If yes, select a scenario that best describes system.	No; the generator would need to be able to connect to a quick connect.
Can the utility connect to generator at treatment facility? If yes, select a scenario that best describes system.	No; the generator would need to be able to connect and run the required water treatment equipment.
Can the utility connect to a generator in distribution system? If yes, select a scenario that best describes system.	No; a stationary 800kW generator for the treatment plant and high service pumps. The system would need an upgrade for quick connect power connections to provide power service.

TETRA TECH

Does the utility have adequate fuel on hand for the generator?		No			
What is your on-hand	l fuel storage	and how	Gallons		Hours
What is your on-hand fuel storage and how long will it last operating at full capacity?		N/A		N/A	
Duranida a liat of		Supp	olier		Phone Number
Provide a list of suppliers that could provide generators	Generator	Caterpillar			(304) 949-6400
and fuel in the event of an emergency:	Generator		Cummins		(304) 769-1012
or arremergency.	Fuel		RT Rogers		(304) 466-1733
Does the utility test the generator(s) periodically?		No			
Does the utility routinely maintain the generator?		No			
If no scenario describing the ability to connect to generator matches the utility's system or if utility does not have ability to connect to a generator, describe plans to respond to power outages:		After reviewing the backup power system alternatives, a 800 kw generator quote has been added to the continger plan. The 800 kW is what is recommended from Cummin based on the power service to the water treatment plant		en added to the contingency commended from Cummins	

Information for this table was taken from the Source Water Protection Contingency Plan prepared by The Thrasher Group. The complete report is provided as Appendix D.

### 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. Green Valley Glenwood PSD - Glenwood 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 Green Valley Glenwood PSD - Glenwood

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 Glenwood Plant will be expanding to service the Bluewell PSD.
If not, describe the circumstances and plans to increase production capacity:	N/A



## 11.4 WATER LOSS CALCULATION

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

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

**Table 14. Water Loss Information** 

Total Water Pumped (gal)			213,086,583	
Total Water Purchased (gal)			0	
Total Water Pu	mped and Purchased (gal)		213,086,583	
	Mains, Plants, Filters, Flushing, etc.		0	
Water Loss Accounted for Except Main Leaks	Fire Department	t	41,438	
(gal)	Back Washing		12,990,750	
	Blowing Settling Basins		0	
Total Water Loss Ac	Total Water Loss Accounted For Except Main Leaks			
Water Sold- Total Gallons (gal)			137,241,450	
Water lost from main leaks (gal)			51,117,800	
Unaccounte	ed For Lost Water (gal)		11,695,145	
Total gallons of Unaccounted for Lost Water plus Water Lost from Main Leaks (gal)			62,812,945	
Total Percent Unaccounted For Water and Water Lost from Main Leaks		29.5%		
If total percentage of Unaccounted for Water is greater than 15%, please describe any measures that could be taken to correct this problem:		e inspections and replace older lines.		

TETRA TECH

\*This information was taken from the 2014 Public Service Commission Annual Report for Green Valley Glenwood PSD – Glenwood. Total gallons of unaccounted for lost water and unaccounted for water percentage have recently been corrected, and differ from values reported in the contingency plan.

#### 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.

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

Table 15. Early Warning Monitoring System Capabilities

Does your system currently receive spill notifications from a state agency, neighboring water system, local emergency responders, or other facilities? If yes, from whom do you receive notices?		Yes; The Green Valley-Glenwood PSD Water System receives spill notifications from the WV Health Department		
Are you aware of any facilities, land uses, or critical areas within your protection areas where chemical contaminants could be released or spilled?		No		
Are you prepared to detect potential contaminants if notified of a spill?		Yes		
List laboratories (and contact information) on whom you would rely to analyze water	Laboratories			
	Name		Contact	
	REI Consultants		(304) 255-2500	



samples in case of a reported spill.		WV Offi	ce of Lab Service	s (3	(304) 558-3530	
Do you have an understanding of baseline or normal conditions for your source water quality that accounts for seasonal fluctuations?		Yes				
Does your utility currently monitor raw water (through continuous monitoring or periodic grab samples) at the surface water intake or from a groundwater source on a regular basis?		No				
Provide or estimate the capital and O&M costs for your current or proposed early warning system or upgraded system.	Monito	ring System	YSI EXO 2 (B-1)	Hach sc1000 (B-2)	Real Tech Full Scanning Monitoring System (B-3)	
	C	Capital		\$50,000.00		
	Yea	rly O & M		\$750.00		
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.		N/A				

Information for this table was taken from the Source Water Protection Contingency Plan prepared by The Thrasher Group. The complete report is provided as Appendix D.

## 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

Green Valley Glenwood PSD 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. The Green Valley Glenwood PSD 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 Green Valley Glenwood PSD - Glenwood 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.

TETRA TECH

## 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.



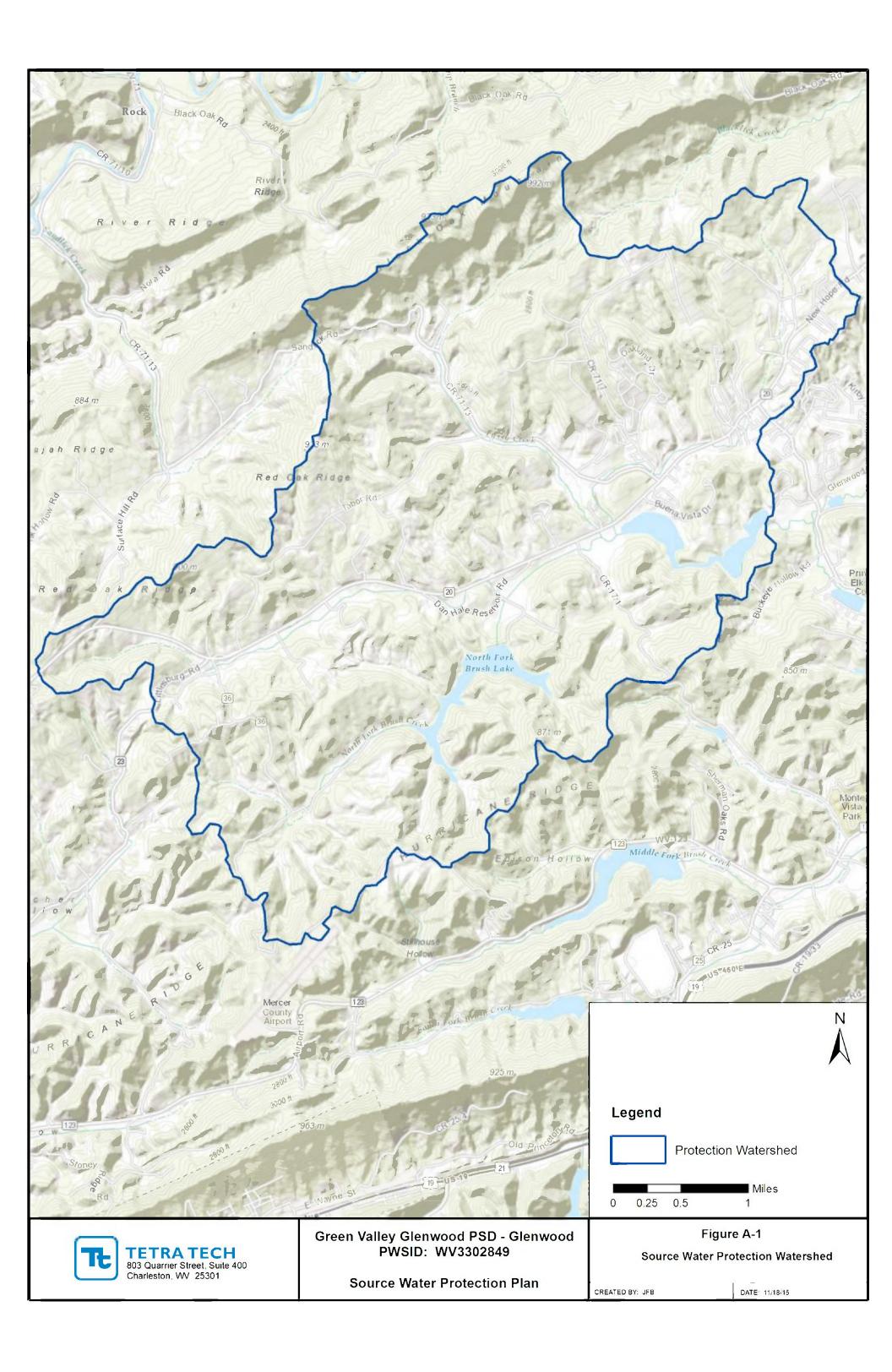
## **15.0 CONCLUSION**

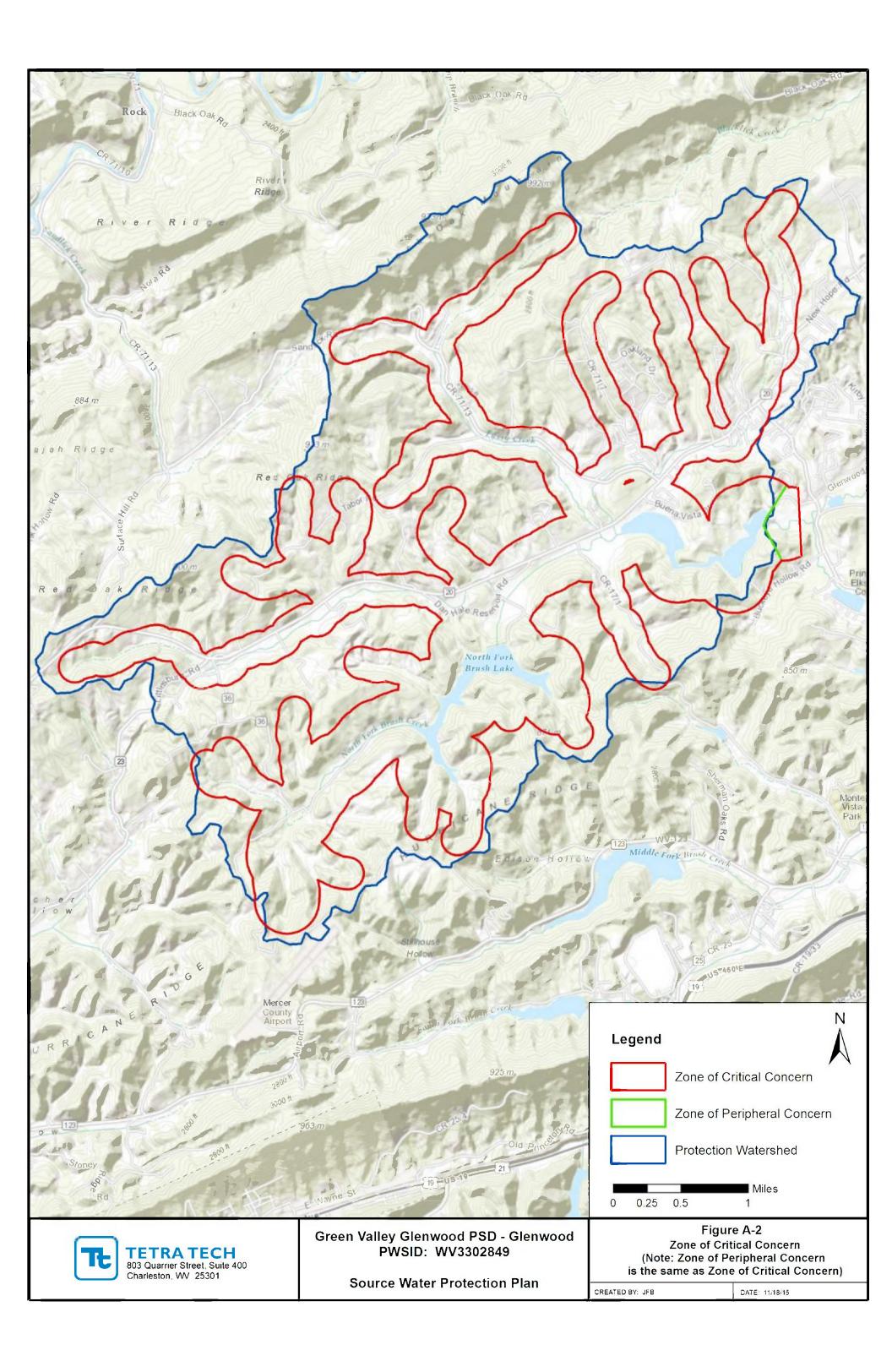
This report represents a detailed explanation of the required elements of Green Valley Glenwood PSD - Glenwood's Source Water Protection Plan. Any supporting documentation or other materials that the utility considers relevant to their plan can be found in **Appendix E**.

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



## **APPENDIX A. FIGURES**





## Wellhead Protection Area (WHPA) Map

Green Valley Glenwood – Glenwood does not have a groundwater source

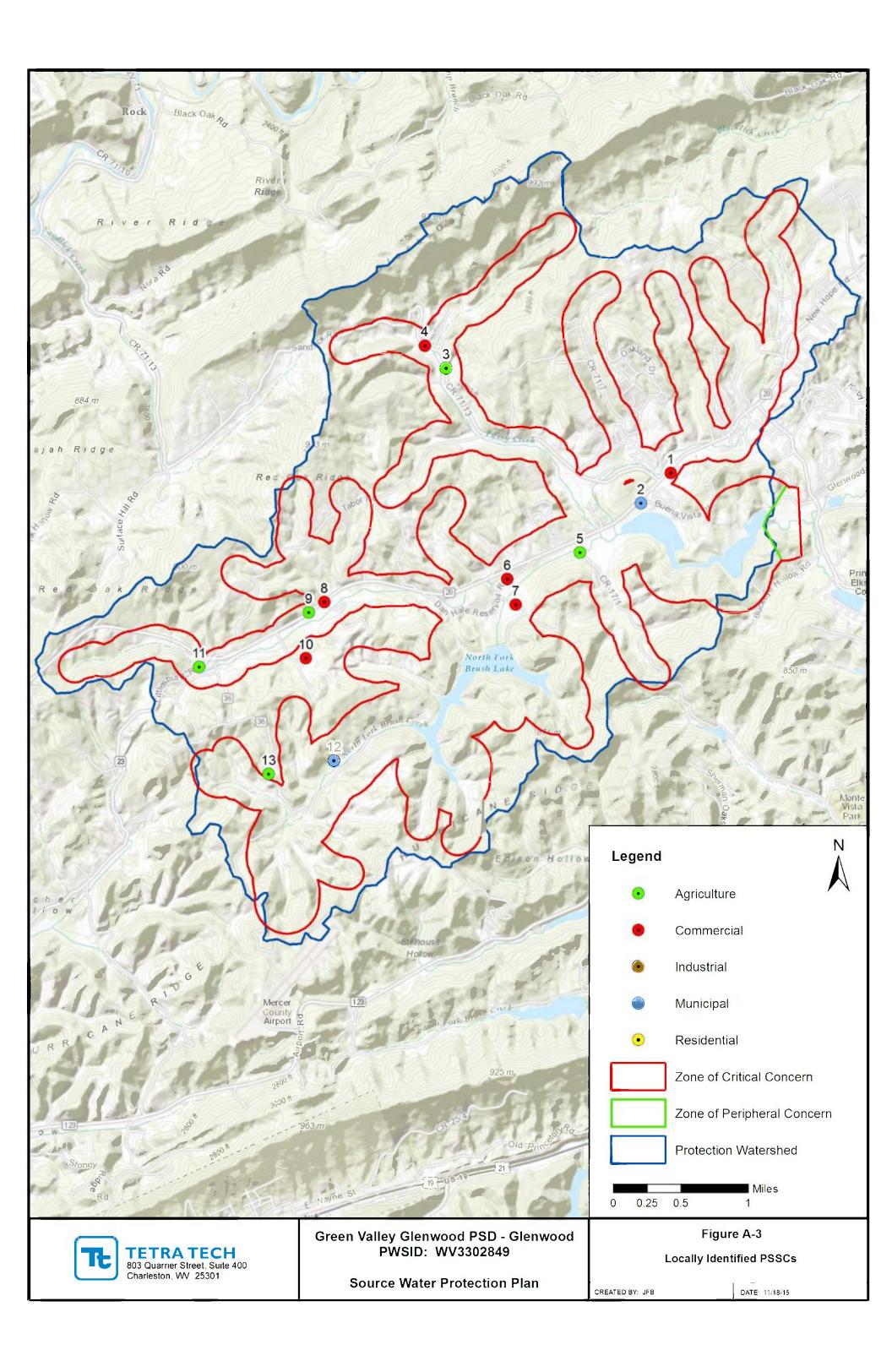


## **List of Locally Identified PSSCs**

PCS No.	Site Name	Site Description	Comments
1	Gas Stations	Citgo gas station	Citgo gas station with car wash
2	Park lands	Glenwood City Park	With fishing access, rest rooms, and playground.
3	Pasture	Pasture	With cattle with access to small impoundments on Fussy Creek
4	Equipment rental/repair shop	T&S Contractors heavy equipment yard	none
5	Pasture	Farm with pasture in floodplain of reservoir tributary	Electric fences but no livestock observed
6	Junk yards, scrap and auto	Small auto salvage yard in Smiths Chapel area	none
7	Repair Shops (engine, appliances, etc.)	McPherson Interlock Machine Company pole barn	With equipment outside
8	Cemeteries	Restlawn Memorial Gardens mausoleum	none
9	Greenhouses/Nurseries	Greenhouses	none
10	Other	B&G Pro Shop	With private pond and outdoor pistol range, on site of former racetrack
11	Pasture	Small pasture in creek bottom	With barn and 5 cows
12	Illegal Dump	Illegal Dump	Along reservoir access road and party spot at old homeplace





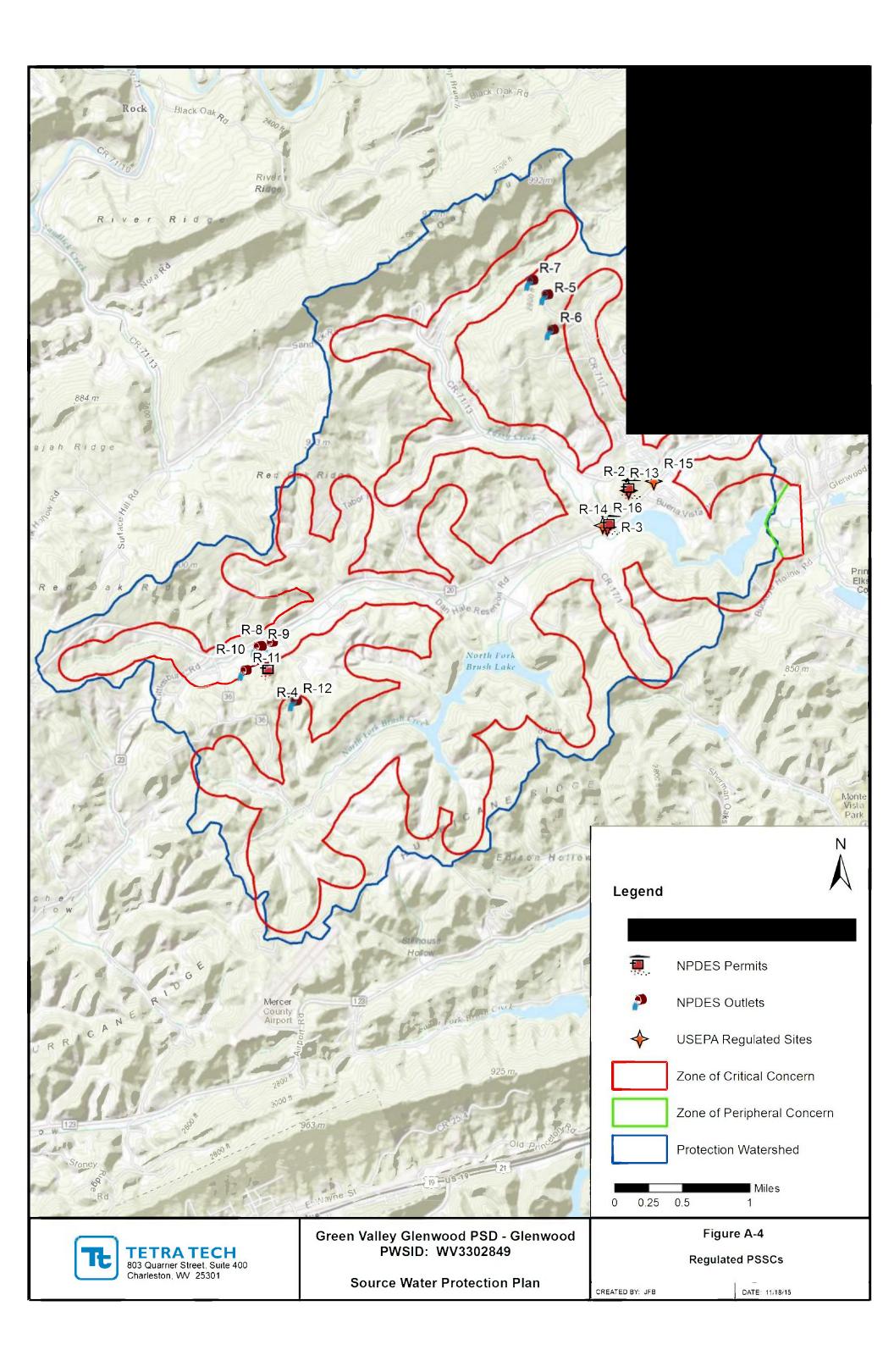


## **List of Regulated PSSCs**

Regulated No.	Site Name	Site Description Regulation		Comments
R-1	Above Ground Storage Tank	12,000 gallon diesel tank	028-00000234	
R-2	Storm Water Construction Permit	Townhouse Development	WVR103461	Keesling Construction Co. 19 acre site
R-3	Storm Water Construction Permit	New Raw Water Intake System And Plant Upgrade	WVR106002	Green Valley Glenwood PSD 2.8 acre site
R-4	Storm Water Construction Permit	Rt. 20 Grade Work	WVR106916	B & J Trucking And Excavating LLC 61.7 acre site
R-5	Sludge/Septic Land Disposal Permit	Bud Whittaker's Septic Tank Service	WVSG10007- LA1	181,440 tons of sludge
R-6	Sludge/Septic Land Disposal Permit	Quality Septic Tank Service	WVSG10006- LA1	116,350 tons of sludge
R-7	Sludge/Septic Land Disposal Permit	Quality Septic Tank Service	WVSG10006- LA2	116,350 tons of sludge
R-8	Storm Water Construction Permit	Rt. 20 Grade Work	WVR106916-001	B & J Trucking and Excavating LLC
R-9	Storm Water Construction Permit	Rt. 20 Grade Work	WVR106916-002	B & J Trucking and Excavating LLC
R-10	Storm Water Construction Permit	Rt. 20 Grade Work	WVR106916-003	B & J Trucking and Excavating LLC
R-11	Storm Water Construction Permit	Rt. 20 Grade Work	WVR106916-004	B & J Trucking and Excavating LLC
R-12	Storm Water Construction Permit	Rt. 20 Grade Work	WVR106916-005	B & J Trucking and Excavating LLC
R-13	USEPA Regulated Site	Townhouse Development	110046129701	none
R-14	USEPA Regulated Site	New Raw Water Intake	110046600978	none
R-15	USEPA Regulated Site	Lusk Corner	110055022407	none
R-16	USEPA Regulated Site	Mitchem's Rod Shop & Used Cars	110055417758	none

April 2016 A-6





## APPENDIX B. EARLY WARNING MONITORING SYSTEM FORMS

### Select and Attach the Appropriate Form for Your System

Form A-Complete if you currently have an early warning monitoring system installed for a surface water source

**Form B**-If you do not currently have an early warning monitoring system installed for a surface water intake or are planning to upgrade or replace your current system, complete this form.

Form C-Complete if you currently have an early warning monitoring system for a groundwater source.

**Form D-** If you do not currently have an early warning monitoring system installed for a groundwater source or are planning to upgrade or replace your current system, complete this form.

Note: You may need to fill out and attach more than one form to your Protection Plan, depending on your current situation



B-1 April 2016

#### Appendix B-Form B

Proposed Early Warning Monitoring System Worksheet- Surface Water Source

#### Describe the type of early warning detection equipment that could be installed, including the design.

The early warning detection equipment that could be installed includes a level controller, display module, back panel, level & trough along with conductivity, oil-in-water, ORP, and pH sensors.

### Where would the equipment be located?

Early warning monitoring systems would be located on the raw water intake line where Glenwood Reservoir surface water would enter the laboratory in the water treatment facility.

#### What would the maintenance plan for the monitoring equipment entail?

The proposed maintenance plan for the monitoring equipment shall consist of annual cleaning and/or exchanging of the probe(s) for the controller. Periodic calibration of the unit may also be required.

#### Describe the proposed sampling plan at the monitoring site.

Sampling of water quality data occurs every fifteen (15) minutes. The Green Valley-Glenwood PSD Water System would need to retrieve data from the "History" of the controller data collector twice per month.

#### Describe the proposed procedures for data management and analysis.

Data management for the early warning monitoring system consists of data points (up to 500 points or approximately six months per probe) being recorded in the "History" of the controller data collector. To access the "History", the probe has to be plugged into the controller. Data is able to be removed via USB or through a local SCADA system.

April 2016 B-2

## **APPENDIX C. COMMUNICATION PLAN TEMPLATE**

Green Valley Glenwood PSD - Glenwood
PWSID:WV3302813 District:Beckley, District 1
Certified Operator:
Contact Phone Number: 304-425-5678
Contact Email Address:doug_taylor70@hotmail.com
Plan Developed On: February 2016 Plan Update:

#### **ACKNOWLEDGMENTS:**

This plan was developed by Green Valley Glenwood PSD 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.



## **TABLE OF CONTENTS**

INTRODUCTION	1
TIERS REPORTING SYSTEM	
COMMUNICATION TEAM	
COMMUNICATION TEAM DUTIES	
INCIDENT / EVENT COMMUNICATION PROCEDURE	
TIERS FLOW CHART	
EMERGENCY SHORT FORMS	<del>(</del>
EMERGENCY CONTACT INFORMATION	9
PRESS RELEASE ATTACHMENTS	

## 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	<b>A</b> nnouncement	Low	The water system is issuing an announcement to the public and public agencies about an incident or event that could pose a threat to public health and safety.  Additional information will be provided as it becomes available.



В	<b>B</b> oil Water Advisory	Moderate	Water system users are advised to boil any water to be used for drinking or cooking, due to possible microbial contamination. The system operator will notify users when the boil water advisory is lifted.
С	<b>C</b> annot Drink	High	System users should not drink or cook with the water until further notice. The water can still be used for showering, bathing, cleaning, and other tasks.
D	<b>D</b> o Not Use	Very High	The water should only be used for flushing commodes and fire protection until further notice. More information on this notice will be provided as soon as it is available.
E	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
Marty Mariotti	Green Valley Glenwood PSD	304-325- 6832	mmgmpsd@citlink.net	Primary Spokesperson
Doug Taylor	Green Valley Glenwood PSD	304-425- 5678	doug_taylor70@hotmail.com	Secondary Spokesperson
				Member

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

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

TETRA TECH

## 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, 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
  - o 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 will conduct a post-event review and assessment. The purpose of the review is to examine the response to the incident, relevant communication activities, and overall outcomes. Plans and procedures may be updated, altered, or adapted based on lessons learned through this process.



## TIERS FLOW CHART

#### **Public Water Supplier Becomes Aware of Incident or Event**

Conduct initial assessment to determine if the incident/event poses a risk to public health and safety

## Incident Poses Potential a Risk and **Requires Notification within 30 Minutes**

 Public water supplier must issue notification to the public and local health agencies within 30 minutes of determining that incident poses a risk to public health and safety

## **Incident Does Not Pose a Risk** No Further Investigation Is Needed

- Does not require notification to the public and local health agencies in 30 minutes.
- Should notify that known incident does not pose a risk.

### **Activate Incident Response**

 Deploy incident assessment personnel

## Implement Contingency Plan if **Necessary**

Replace/augment water source

Threat is Reduced or Eliminated- Communicate\*

- Adapt as necessary
- Communicate\*

#### **Threat Assessment and Characterization**

- Incident/event type (spill, release, etc.)
- Location of incident/event
- Material(s) involved in spill, release, etc.
- · Quantity of material
- Material movement/migration potential
- Time factor(s) in risk assessment
- Level of risk to water system o Low, moderate, high, very high
- Initial risk characterization

- **Review Incident, Adapt Approach** • Incident response/investigation
  - Communication activities
  - Contingency operations

Communicate\*

## **Return to Normal Operations**

- Monitor any new developments
- Continue managing operations & source water protection program
- Communicate\*

Threat Level Remains or Escalates-Communicate\*

#### Communicate\*

Constant communication with local agencies, public, and the media is critical throughout the entire process. The initial notification should include all pertinent information, depending on the TIERS level. Regular information updates should be provided. The A-B-C-D-E TIERS levels should be updated and explained as necessary.

## **EMERGENCY SHORT FORMS**

## **Emergency Communication Information**

		Name		Phone Number		Email		ail
Designated spokesperson:		Marty Mariotti		304-325-6832		mmgmpsd@citlink.net		citlink.net
Alternate spokesperson:		Doug T	Taylor 304-425-5678		78	doug_taylor70@hotmail.com		
Designated location to disseminate information to media:				-				
			Word of mouth		F	Posted notices		X
Methods of o		Door-to-door canvasing				Radio		х
			Newspaper			Other		Х
Media	Naı	me		Title		Phone lumber		Email
contacts:	N/	A						

## **Emergency Services Contacts**

	Name	Emergency Phone	Alternate Phone	Email
Local Police	Mercer County Sheriff's Department	911	304-487-8384	-
Local Fire Department	Green Valley Glenwood Volunteer Fire Department	911	304-327-8375	-
Local Ambulance Service	Princeton Rescue Squad Incorporated Station 4	911	304-425-3914	-

TETRA TECH

Hazardous Material Response Service	East River Volunteer Fire Department	911	304-425-2554	-	
--	--	-----	--------------	---	--

## **Key Personnel**

	Name	Title	Phone	Email
Key staff	Marty Mariotti	Utility Administrative Contact/Manager	304-325-6832	mmgmpsd@citlink.net
responsible for coordinating emergency response	Doug Taylor	Plant Manager	304-425-5678	doug_taylor70@hotma il.com
procedures?	John Poole	Outside Manager/Line Crew Manager		-
Staff responsible for keeping confidential PSSC information and	Marty Mariotti	Utility Administrative Contact/Manager	304-325-6832	mmgmpsd@citlink.net
releasing to emergency responders:	Doug Taylor	Plant Manager	304-425-5678	doug_taylor70@hotma il.com

## **Sensitive Populations**

Other communities that are served by the utility:	N/A				
Major user/sensitive	Name	Alternate Phone			
population notification:	Glenwood School	304-425-2445	-		
	Name	Phone	Email		



EED District Office Contact:		John Stafford		Alternate- After H (Answe	304-256-6666 -304-558-2981 (Centra Office) Hours-304-558-2981 ring service will notify te individuals in case of emergency)	John.PB.Stafford @wv.gov
OEHS Readiness Coordinator		Warren Von Dollen		304-356-4290 (main) 304-550-5607 (cell)		warren.r.vondollen @wv.gov
Downstream Water Contacts:	Water System Name		Conta	ct Name	Emergency Phone	Alternate Phone
	WVAW-Bluestone Plant		John Pentasuglia, Jr.		304-466-3365	-
Are you planning on implementing the TIER system?			TIER System already in place.			

## **Emergency Response Information**

	Name		Phone	
List laboratories available to perform sample analysis in case of emergency:	REIC, Beaver WV office		1-800-999-0105 (Contact: Kathy Berry)	
Has the utility developed a detailed Emergency Response Plan in accordance with the Public Health Security Bioterrorism Preparedness and Response Pan Act of 2002?		Yes		
When was the Emergency Response Planupdated?		n developed or las	it	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/

C-9



## PRESS RELEASE ATTACHMENTS

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

# UTILITY ISSUED NOTICE – LEVEL A PUBLIC WATER SYSTEM ANNOUNCEMENT A WATER SYSTEM INVESTIGATION IS UNDERWAY

On at <u>:</u> AM/PM, th	ne	Water System began
investigating an incident that may affect	ct local water quality.	
The incident involves the following situ	uation at this location:	
There are no restrictions on water use	e at this time. As always, if wai	ter system customers notice
There are no restrictions on water use	at tino timo. Ao aiwayo, ii wai	ter system edatemers notice
anything unusual about their water – s	such as abnormal odors, color	rs, sheen, etc. – they should
contact the water system at		
At this time there is no need for concer	rn if you have consumed or u	sed the water.
Regular updates will be provided abou	ut this Announcement as wate	er system staff continue their
investigation. Again, there are no restr	rictions on water use at this tir	ne.
State Water System ID#	Nate Nistrih	nited.

# UTILITY ISSUED NOTICE – LEVEL B BOIL WATER ADVISORY A BOIL WATER ADVISORY IS IN EFFECT

On at: am/pm, a water problem occurred causing contamination of you water. The areas that are affected are as follows:
□ Entire Water System or □ Other:
CONDITIONS INDICATE THERE IS A HIGH PROBABILITY THAT YOUR WATER IS CONTAMINATED. TESTING HAS NOT OCCURRED TO CONFIRM OR DENY THE PRESENCE OF CONTAMINATION IN YOUR WATER.
What should I do?
<ul> <li>DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST. Bring all water to a bole let it boil for one minute, and let it cool before using, or use bottled water. Boiled or bottled water should be used for drinking, making ice, brushing teeth, washing dishes bathing, and food preparation until further notice. Boiling kills bacteria and other organisms in the water.</li> </ul>
What happened?
The problem is related to
What is being done?
The water system is taking the following action:
What should a customer do if they have consumed or used the water?
We will inform you when you no longer need to boil your water. We anticipate resolving the problem within hours/days. For more information, please contact at at
General guidelines on ways to lessen the health risk are available from the EPA Safe Drinkin Water Hotline at 1 (800) 426-4791.
Please share this information others who use this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.
This notice was distributed by
State Water System ID# Date Distributed:



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

On at: am/pm, a water problem occurred causing contamination of your water. The areas that are affected are as follows:
□ Entire Water System or □ Other:
CONDITIONS INDICATE THERE IS A HIGH PROBABILITY THAT YOUR WATER IS CONTAMINATED. TESTING HAS NOT OCCURRED TO CONFIRM OR DENY THE PRESENCE OF CONTAMINATION IN YOUR WATER.
What should I do?
<ul> <li>DO NOT DRINK THE WATER. You can't drink the water, but you can use it for showering, bathing, toilet-flushing, and other non-potable purposes.</li> </ul>
<ul> <li>BOILING WILL NOT PURIFY THE WATER. Do not drink the water, even if it is boiled.</li> <li>The type of contamination suspected is not removed by boiling.</li> </ul>
What happened?
The problem is related to
What is being done?
The water system is taking the following action:
What should a customer do if they have consumed or used the water?
We will inform you when the water is safe to drink. We anticipate resolving the problem within hours/days. For more information – or to report unusual water conditions such as abnormal odors, colors, sheen, etc. – please contact at or at
Please share this information others who use this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.
This notice was distributed by
State Water System ID# Date Distributed:

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

	_ at <u>    :                                </u>	n, a water problem occurred causing contamination of your are as follows:
		her:
CONTAMINA	TED. TESTING HAS	IS A HIGH PROBABILITY THAT YOUR WATER IS NOT OCCURRED TO CONFIRM OR DENY THE N IN YOUR WATER.
What should	I do?	
• DO NO	OT DRINK THE WAT	TER. The water is contaminated.
		ATHE IN THE WATER. You can't use the water for drinking, in be used for toilet flushing and firefighting.
		<b>FY THE WATER.</b> Do not use the water, even if it is boiled. suspected is not removed by boiling.
What happer	ned?	
• The p	roblem is related to	)
What is being	g done?	
• The w	ater system is takii	ng the following action:
What should	a customer do if th	ney have consumed or used the water?
abnormal odd	ours/days. For more	r is safe to drink. We anticipate resolving the problem within information – or to report unusual water conditions such as c. – please contact or
received this	notice directly (for ex	rs who use this water, especially those who may not have cample, people in apartments, nursing homes, schools, and osting this notice in a public place or distributing copies by
This notice wa	as distributed by	
State Water S	System ID#	Date Distributed:



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

On \_\_\_\_\_ at \_\_\_\_ am/pm, a water problem occurred causing contamination of your

water. The areas that are affected are as follo	WS:
□ Entire Water System or □ Other:	
CONDITIONS INDICATE THERE IS A HIGH CONTAMINATED. TESTING HAS NOT OCC PRESENCE OF CONTAMINATION IN YOUR	URRED TO CONFIRM OR DENY THE
What should I do?	
DO NOT DRINK THE WATER. The water.	ater is contaminated.
<ul> <li>DO NOT USE THE WATER FOR AN's showering, or bathing, or any other us</li> </ul>	Y PURPOSE! You can't use the water for drinking e – not even for toilet flushing.
BOILING WILL NOT PURIFY THE W The type of contamination suspected in	ATER. Do not use the water, even if it is boiled. s not removed by boiling.
What happened?	
The problem is related to	
What is being done?	
The water system is taking the following the followin	owing action:
What should a customer do if they have co	
We will inform you when the water is safe to hours/days. For more information	drink. We anticipate resolving the problem within n – or to report unusual water conditions such as contact or
received this notice directly (for example, peo	this water, especially those who may not have ple in apartments, nursing homes, schools, and notice in a public place or distributing copies by
This notice was distributed by	
State Water System ID#	Date Distributed:

TETRA TECH

## APPENDIX D. SINGLE SOURCE FEASIBILITY STUDY





Source Water Protection Contingency Plan Green Valley-Glenwood Public Service District Glenwood Water System PWSID 3302849

Mercer County, WestVirginia August 2015

"This program is being presented with financial assistance as a grant from the West Virginia Department of Health and Human Resources."



## Title of Preparer Project Engineer

## Name of Contractor(s)/Consultant(s) (if used): The Thrasher Group, Inc.

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

Signature of responsible party or designee authorized to sign for water Green Valley-Glenwood PSD Water System:

Print Name of Authorizing Signatory (see instructions):

Title of Authorizing Signatory:

Date of Submission (mm/dd/yyyy): 9/30/2015

## TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
PURPOSE	2
What are the benefits of preparing a Source Water Protection Plan?	2
BACKGROUND: WV SOURCE WATER ASSESSMENT AND PROTECTION PROGRAM.	3
STATE REGULATORY REQUIREMENTS	3
SYSTEM INFORMATION	4
Table 1 – Population Served by the Green Valley-Glenwood PSD Water System	5
WATER TREATMENT AND STORAGE	5
Table 2 – Green Valley-Glenwood PSD Water System Water Treatment Information	6
Table 3 – Green Valley-Glenwood PSD Water System Surface Water Sources	7
Table 4 – Green Valley-Glenwood PSD Water System Groundwater Sources	7
Response Networks and Communication	8
Table 5 – Green Valley-Glenwood PSD Water System Water Shortage Response Capability	8
Operation During Loss of Power	9
Table 6 – Generator Capacity	9
Future Water Supply Needs	10
Table 7 – Future Water Supply Needs for the Green Valley-Glenwood PSD Water System	11
Water Loss Calculation	11
Table 8 – Water Loss Information	12
Early Warning Monitoring System	13
Table 9 – Early Warning Monitoring System Capabilities	14
SINGLE SOURCE FEASIBILITY STUDY	15
CONCLUSION & RECOMMENDATION	15
APPENDIX A – EARLY WARNING MONITORING SYSTEM FORMS	17
APPENDIX B – FEASIBILITY STUDY MATRIX	50
APPENDIX C – ALTERNATIVES ANALYSIS	52
APPENDIX D – SUPPORTING DOCUMENTATION	58

#### **EXECUTIVE SUMMARY**

This Source Water Protection Contingency Plan is being developed for Green Valley-Glenwood Public Service District Glenwood Water System (District), and is to be included as a portion of the complete Source Water Protection Plan being completed by other parties (per the West Virginia Bureau for Public Health).

The District's water system is a state regulated public water system serving the areas of Glenwood, Maple Acres, Green Valley and Edison areas of Mercer County. The District's water system serves 2,813 residential customers, and 157 commercial customers as reported in the 2014 Public Service Commission (PSC) annual report.

The District's Glenwood water treatment plant primary source of raw water is the Glenwood Reservoir. The plant has a treatment capacity of 876,000 gallons per day and pumps approximately 14.5 hours per day on average. The plant currently produces an average of 550,000 gallons per day. The District Glenwood water system maintains four (4) treated water storage tanks totaling 652,000 gallons of treated water and has 94,000,700 gallons of raw water storage in the Glenwood Reservoir. Currently, the water system is experiencing 36% unaccounted for water; however, the District Glenwood water system is conducting leak detection and making necessary repairs to reduce unaccounted for water. The District's water system currently does not have a generator.

The District's water system currently has a project under review by the West Virginia Public Service Commission (PSC) to expand the Glenwood water treatment plant. The District Glenwood water system will provide water to Bluewell Public Service District Glenwood water system and the District's Bulltail water system customers. The proposed project will create an additional intake for the Glenwood water treatment plant on the Doctor Daniel Hale Reservoir.

Based on the evaluation, the District currently has two alternative water sources in place and sufficient raw water storage in the event that the primary water source is contaminated. In addition to maintaining this existing alternative water sources, it is recommended that the District install an early warning monitoring system upstream of the primary intake. An early warning system can be used to notify the District of a contamination event before it reaches the intake or plant which will reduce the impact to the water system. Further explanations of the costs are provided in Appendix D, "Supporting Documentation".

## Backup Intake

The District's water system currently uses the Glenwood Reservoir intake as their primary source of surface water and a secondary intake on the Doctor Daniel Hale Reservoir. The Doctor Daniel Hale Reservoir can be the primary intake if required. The Doctor Daniel Hale Reservoir is scheduled to start construction in 2015 which will give the District Glenwood water treament plant a Second intake.

#### Interconnection

The District's water system is currently interconnected with the West Virginia American Water Company (WVAWC) Bluefield system. After analysis of treatment capacities and average water production of WVAWC systems, it was concluded that the WVAWC Bluefield treatment plant would be able to provide all the water demand of the District's.

## Treated Water Storage

The District's water system currently has 652,000 gallons of treated water storage. Senate Bill 373 requires two (2) days of storage based on the maximum water produced. The District Glenwood water system will need 1,752,000 gallons of treated water storage to satisfy the minimum required storage. The District Glenwood water system will need to increase its treated water storage by 1,100,000 gallons.

## Raw Water Storage

The District's water system currently has 94,000,700 gallons of raw water storage available Glenwood Reservoir. The Glenwood Reservoir satisfies the minimum required raw water storage capacity, the District Glenwood water system needs 2,750,000 gallons of storage to meet the minimum required. The District Glenwood water system meets the required amount for raw water storage.

This SWPCP describes in detail the aforementioned aspects of the District Glenwood water system, analyzes alternatives for sources of water supply, and compares alternatives in a feasibility matrix to determine the most suitable and feasible alternative for the District. Based on the evaluation, the District Glenwood water system has sufficient alternative water sources in place. A recommendation for the District is to install an early warning monitoring system and a backup generator for the plant and pump stations.

## **PURPOSE**

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

The intent of this document is to describe what the District Glenwood water system 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, the District Glenwood water system acknowledges that implementing measures to prevent contamination can be a relatively economical way to help ensure the safety of the drinking water.

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

- Fulfills the requirement for the public water utilities to complete or update their source water protection plan.
- Identifies and prioritizes potential threats to the source of drinking water; and establishes strategies to minimize the threats.
- Plans for emergency responses to incidents that compromise the water supply by contamination or depletion, including how the public, state, and local agencies will be informed.

- Plans for future expansion and development, including establishing secondary sources of water.
- Ensures conditions to provide the safest and highest quality drinking water to customers at the lowest possible cost.
- Provides more opportunities for funding to improve infrastructure, purchase land in the protection area, and other improvements to the intake or source water protection areas.

## BACKGROUND: WV SOURCE WATER ASSESSMENT AND PROTECTION PROGRAM

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

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

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

## STATE REGULATORY REQUIREMENTS

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

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

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

### SYSTEM INFORMATION

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

Table 1 – Population Served by the Green Valley-Glenwood PSD Glenwood Water System

Administrative off	ice location:	P.O. Box 1518 Bluefield, WV 24701					
Is the system a pul Public Service Con	blic utility, according to the mmission rule?	Green Valley-Glenwood PSD Glenwood Water System					
Date of Most Rece Assessment Repor		April 2003 By Bureau for Public Health					
Date of Most Rece Plan:	nt Source Water Protection	April 2011					
Population served	directly:	2,813 Residential; 157 Commercial 2,970 Total Customers					
D. W. ***	System Name		PWSID Number Popula				
Bulk Water Purchaser Systems:	N/A		N/A	N/A			
Systems.	N/A		N/A	N/A			
Total Population S Glenwood PSD W	Served by the Green Valleyater System:	7,251					
	alley-Glenwood PSD Water ple source water protection	No					
How many SWPA Glenwood PSD W	s does the Green Valley- ater System have?	One - Glenwood Reservoir					

## WATER TREATMENT AND STORAGE

As required, the District Glenwood water system 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 District. Information about the surface water sources from which the District Glenwood water system draws water can be found in **Table 3**. If the District 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 – the Green Valley-Glenwood PSD Water System Water Treatment Information

	Lake/Raw Water Source						
	<b>↓</b> .						
	Aeration						
	Sedimentation						
	<b>↓</b>						
	Filters						
Water Treatment Process (List in	,						
order)	Clear Well						
	↓ High Service Pumps						
	↓						
	Tanks						
Current Treatment Capacity (gal/day)	876,000 GPD						
	,						
Current Average Production (gal/day)	550,000 GPD						
Maximum Quantity Treated and	876,000 GPD						
Produced (gal)							
Minimum Quantity Treated and	500,000 GPD						
Produced (gal)	, , , , , , , , , , , , , , , , , , ,						
Average Hours of Operation	14.5 hours per day						
Maximum Hours of Operation in One	24 hours per day						
Day	2 i nodis per day						
Minimum Hours of Operation in One	0 hours per day						
Day							
Number of Storage Tanks Maintained	4						
<b>Total Gallons of Treated Water</b>	652,000 GAL						
Storage (gal)	002,000 G/H						
Total Gallons of Raw Water Storage	94,000,700 GAL						
(gal)	, ,						

Table 3 – Green Valley-Glenwood PSD Water System Surface Water Sources

Intake Name	SDWIS #	Local Name	Describe Intake	Name of Water Source	Date Constructed/ Modified	Frequency of Use (Primary/ Backup/ Emergency)	Activity Status (Active/ Inactive)
Glenwood Reservoir	-	Glenwood Reservoir	Gravity feed with screen to raw water pump station	Glenwood Reservoir	1970's	Primary	Active
Daniel Hale Reservoir	-	Daniel Hale Reservoir	Gravity feed with screen to raw water pump station	Daniel Hale Reservoir	1960's	Primary	Active

 $Table\ 4-the\ Green\ Valley-Glenwood\ PSD\ Water\ System\ Groundwater\ Sources$ 

Does the Green Valley-Glenwood PSD Water System blend with	No
groundwater?	110

## **Response Networks and Communication**

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

**Table 5 – The Green Valley-Glenwood PSD Glenwood Water System Water Shortage Response Capability** 

Can the utility isolate or divert contamination from the intake or groundwater supply?	No
Describe the utility's capability to isolate or divert potential contaminants:	N/A
Can the utility switch to an alternative water source or intake that can supply full capacity at any time?	Yes
Describe in detail the utility's capability to switch to an alternative source:	The District Glenwood water system can switch to the WVAWC Bluefield Systems and Bluewell PSD by closing gate valves.
Can the utility close the water intake to prevent contamination from entering the water supply?	Yes
How long can the intake stay closed?	The intake can stay closed as long as WVAWC Bluefield can supply water. (See Note Below)
Describe the process to close the intake:	Closing gate valves
Describe the treated water storage capacity of the water system:	The District has four (4) storage tanks totaling 652,000 gallons of treated water storage.
Is the utility a member of WVRWA Emergency Response Team?	Yes
Is the utility a member of WV-WARN?	Yes
List any other mutual aid agreements to provide or receive assistance in the event of an emergency:	Yes
List any other mutual aid agreements to provide or receive assistance in the event of an emergency:	Interconnection with the WVAWC Bluefield System

Note: In the event the primary source is contaminated, it is recommended that the Utility evaluate the water storage on hand at that time and determine that the alternative source is sufficient to sustain the water system for the duration of shutdown.

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

## **Operation during Loss of Power**

This District Glenwood water system analyzed and examined its ability to operate effectively during a loss of power. This involved ensuring a means to supply water through treatment, storage, and distribution without creating a public health emergency. Information regarding the District's capacity for operation during power outages is shown in **Table 6**. The District's standby capacity would have the capability to provide power to the system as if normal power conditions existed. The District's emergency capacity would have the capability to provide power to only the essential equipment and treatment processes to provide water to the system. Information regarding the emergency generator capacity for each District Glenwood water system was calculated by the WV BPH and can be found in Appendix D, "Supporting Documentation".

**Table 6 – Generator Capacity** 

What is the type and capacity of the generator needed to operate during a loss of power?	800 kW stationary or with a 1200A automatic transfer switch.					
Can the utility connect to generator at intake/wellhead? If yes, select a scenario that best describes system.	No; the generator would need to be able to connect to a quick connect.					
Can the utility connect to generator at treatment facility? If yes, select a scenario that best describes system.	No; the generator would need to be able to connect and run the required water treatment equipment.					
Can the utility connect to a generator in distribution system? If yes, select a scenario that best describes system.	No; a stationary 800kW generator for the treatment plant and high service pumps. The system would need an upgrade for quick connect power connections to provide power service.					
Does the utility have adequate fuel on hand for the generator?	No					
What is your on-hand fuel storage and	Gallons	Hours				
how long will it last operating at full capacity?	N/A	N/A				

Provide a list of		Supplier		Contact Name Pho Num						
suppliers that could provide generators	Generator	Cate	erpillar	Walker-CAT	(304) 949-6400					
and fuel in the	Generator	Cui	mmins	Crosspoint	(304) 769-1012					
event of an emergency:	Fuel	RT	Rogers		(304) 466-1733					
emergency.	Fuel									
Does the utility t perio	est the gener dically?	rator(s)	No							
Does the utility routinely maintain the generator?			No							
If no scenario descenario de de descenario de descenario de descenario de descenario de descen	r matches th loes not have	e utility's e ability to e plans to	-							

If a portable generator is available through the respective county's 911 or Emergency Center, it is assumed the generator is available **only** for the utility for which this source water protection contingency plan is prepared. If more than one utility in the county uses the portable generator during power outages, it is suggested that each utility procure a generator specifically to protect their system during a power outage.

## **Future Water Supply Needs**

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

Table 7 – Future Water Supply Needs for the Green Valley-Glenwood PSD Glenwood Water System

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 Glenwood Plant will be expanding to service the Bluewell PSD.
If not, describe the circumstances and plans to increase production capacity:	N/A

#### **Water Loss Calculation**

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

To further clarify, metered usages are most often those that are distributed to customers. Non-metered usages estimated include water used by fire departments for fires or training, un-metered bulk sales, flushing to maintain the distribution system, backwashing filters, and cleaning settling basins. By totaling the metered and non-metered uses, the District Glenwood water system calculates unaccounted for water. Note: To complete annual reports submitted to the PSC, utilities typically account for known water main breaks by estimating the amount of water lost. However, for the purposes of the source water protection plan, any water lost due to leaks – even if the system is aware of how much water is lost at a main break – is not considered a use. Water lost through leaks and main breaks cannot be controlled during water shortages or other emergencies and should be included in the calculation of percentage of water loss for purposes of the source water protection plan. The data in Table 8 is taken from the most recently submitted District Glenwood water system PSC Annual Report.

**Table 8 – Water Loss Information** 

Total Water Pump	ed (gal)	213,086,583				
Total Water Purch	ased (gal)	0				
Total Water Pump	ed and Purchased (gal)	213,086,583				
	Mains, Plants, Filters, Flushing, etc.	0				
Water Loss Accounted for	Fire Department	41,438				
Except Main Leaks (gal)	Back Washing	12,990,750				
	Blowing Settling Basins	0				
Total Water Loss A	Accounted For Except Main Leaks	13,032,188				
Water Sold- Total	Gallons (gal)	137,241,450				
Unaccounted For I	Lost Water (gal)	24,474,596				
Water lost from ma	ain leaks (gal)	51,117,800				
Total gallons of Un Lost from Main Le	accounted for Lost Water and Water eaks (gal)	75,592,396				
Total Percent Unac from Main Leaks (	ecounted For Water and Water Lost %)	36				
•	of Unaccounted for Water is greater escribe any measures that could be is problem:	Increase inspections and replaceme of older lines has been conducted				

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

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

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

 $Table \ 9-Early \ Warning \ Monitoring \ System \ Capabilities$ 

Does your system currently reconstilled notifications from a state agency water system, local emergency other facilities? If yes, from where the receive notices?	cy, neighboring responders, or	Yes; The Green Valley-Glenwood PSD Water System receives spill notifications from the WV Health Department							
Are you aware of any facilities, critical areas within your prote where chemical contaminants or released or spilled?	ection areas	No							
Are you prepared to detect pot contaminants if notified of a sp		Yes							
		Lal	orator	ries					
List laboratories (and contact information) on which you	Na	ıme		Contact					
would rely to analyze water samples in case of a reported	REI Co	nsultants		(304) 255-2500					
spill.	WV Office o	f Lab Servic	es	(304) 558-3530					
Do you have an understanding normal conditions for your sou quality that accounts for season fluctuations?	rce water	Yes							
Does your Green Valley-Glenw Water System currently monitorin (through continuous monitorin grab samples) at the surface wa from a groundwater source on	or raw water g or periodic ater intake or	No							
Provide or estimate the capital		Capital		\$50,000.00					
costs for your current or propo warning system or upgraded sy	<u> </u>	Yearly O&M		\$750.00					
Do you serve more than 100,00 so, please describe the methods monitor at the same technical l by ORSANCO.	you use to	N/A							
Note: Complete appropriate Early Warning Monitoring form for your system in Appendix A (Line 71). WVAWC maybe a viable option to expedite the testing of water samples.									

#### 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 its primary source of supply is detrimentally affected by contamination, release, spill event or other reason. These alternatives may include a secondary intake, two days of raw or treated water storage, interconnections with neighboring systems, or other options identified on a local level. Note: a secondary intake would draw water supply from a substantially different location or water source.

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

#### CONCLUSION & RECOMMENDATION

This report represents a detailed explanation of the required elements of the District's Source Water Protection Plan. Any supporting documentation or other materials that the District Glenwood water system considers relevant to their plan can be found in **Appendix D**.

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 are 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.

Based on the evaluation of the existing water system, there are sufficient backup water sources in place in the event of contamination of the primary source. It is recommended that the District install a backup generator system for its treatment plant and pump stations and install and early warning monitoring system upstream of the existing primary intake. The early warning monitoring system would provide advance notice in the event of contamination and allow the District to shut down the intake and plant and minimize the impact of contamination.

As shown in the Feasibility Matrix in Appendix B, the alternative with the highest final score of feasibility is the interconnection with WVAWC Bluefield. The interconnection with WVAWC Bluefield shall provide the treatment facility with a feasible backup source of water supply in the event that their primary water source becomes contaminated. A cost estimate is provided below. Further explanations of the costs are provided in Appendix D, "Supporting Documentation".

## **RECOMMENDED ALTERNATIVE COST ESTIMATE**

1	LS	800 KW Genarator		\$ 213,768
1	LS	Early Warning System		\$ 50,000
1	LS	Operation & Maintenance for Early Warning System		\$750
			TOTAL =	\$264,518

ASSUMPTIONS: Construction will start 2015 on the second intake on Doctor Daniel Hale Reservoir.

**APPENDIX A – EARLY WARNING MONITORING SYSTEM FORMS** 

**Form A** – Complete if you currently have an early warning monitoring system installed for a surface water source.

Form B – If you do not currently have an early warning monitoring system installed for a surface water intake or plan to upgrade or replace your current system, complete this form.

**Form C** – Complete if you currently have an early warning monitoring system for a groundwater source.

Form D – If you do not currently have an early warning monitoring system installed for a groundwater source or plan to upgrade or replace your current system, complete this form.

Note: You may need to fill out and attach more than one form to your Protection Plan, depending on your current situation.

## Appendix A – Form B

Proposed Early Warning Monitoring System Worksheet- Surface

# Describe the type of early warning detection equipment that could be installed, including the design.

The early warning detection equipment that could be installed includes a level controller, display module, back panel, level & trough (see cost estimate by Hach Company in Appendix D, "Supporting Documentation") along with conductivity, oil-in-water, ORP, and pH sensors.

## Where would the equipment be located?

Early warning monitoring systems would be located on the raw water intake line where Glenwood Reservoir surface water would enter the laboratory in the water treatment facility.

## What would the maintenance plan for the monitoring equipment entail?

The proposed maintenance plan for the monitoring equipment shall consist of annual cleaning and/or exchanging of the probe(s) for the controller. Periodic calibration of the unit may also be required.

## Describe the proposed sampling plan at the monitoring site.

Sampling of water quality data occurs every fifteen (15) minutes. The Green Valley-Glenwood PSD Water System would need to retrieve data from the "History" of the controller data collector twice per month.

### Describe the proposed procedures for data management and analysis.

Data management for the early warning monitoring system consists of data points (up to 500 points or approximately six months per probe) being recorded in the "History" of the controller data collector. To access the "History", the probe has to be plugged into the controller. Data is able to be removed via USB or through a local SCADA system.

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

## **APPENDIX B - FEASIBILITY STUDY MATRIX**

Feasibility Mat	rix		Greei	n Valley Glei	nwood		PWSID:		WV3302849	)	Date:	7/23	<b>2015</b>	Comple	eted by:	Project Engineer - The Thrasher Group, Inc.				o, Inc.	
			onomic Crit	eria				Te	chnical Crite						Environme	/					
Alternative Strategy Description	Operation & Main	esin strong			Weighten	Permit.	Result.	Alloc.	Institutions.	Total	lear Votage	S. S	Environment	Aesthetic.	Stakeholds	Messylan		Weighted Total	Final Score	Total Capital Cost	Comments
Backup Intake	3.0	3.0	6.0	100.0%	40.0%	3.0	3.0	3.0	3.0	12.0	100.0%	40.0%	3.0	3.0	3.0	9.0	100.0%	20.0%	100.0%		Backup Intake with the Shupe Reservoir
Interconnect	3.0	3.0	6.0	100.0%	40.0%	3.0	3.0	3.0	3.0	12.0	100.0%	40.0%	3.0	3.0	3.0	9.0	100.0%	20.0%	100.0%		Has interconnection with Bluefield West Virginia American Water System
Treated Water Storage	2.0	3.0	5.0	83.3%	33.3%	2.2	2.5	2.7	3.0	10.4	86.4%	34.6%	3.0	2.0	2.0	7.0	77.8%	15.6%	83.4%	\$1,200,125.00	The Glenwood Water System currently has 652,000 gallons of treated water storage; that does not meet the minimum requirements. Proposed 1,260,000
Raw Water Storage	3.0	3.0	6.0	100.0%	40.0%	3.0	3.0	3.0	3.0	12.0	100.0%	40.0%	3.0	3.0	3.0	9.0	100.0%	20.0%	100.0%		Glenwood Reservoir meets minimum requirements
Other (Specify)	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%	\$0.00	

## Scoring:

- 0 Not feasible. Criterion cannot be met by this alternative and removes the alternative from further consideration.
- Feasible but difficult. Criterion represents a significant barrier to successful implementation but does not eliminate it from consideration.
- Feasible. Criterion can be met by the alternative.
- Very Feasible. Criterion can be easily met by the alternative.

## **APPENDIX C – ALTERNATIVES ANALYSIS**

### **ANALYSIS OF ALTERNATIVES**

The District's water system currently has an alternative source of water supply, adequate raw water storage and an existing interconnection. These existing alternatives were considered during the feasibility analysis. Additional detail is provided below.

#### 1. Backup Intake

The District's surface water intake located on Glenwood Reservoir is currently the primary source of water supply. The Doctor Daniel Hale Reservoir is the backup intake which can fully sustain the water system's maximum demand. Thus, this alternative will be considered during the feasibility analysis.

The construction of an additional backup intake located on Doctor Daniel Hale Reservoir is under review by the PSC and construction is scheduled to start in 2015.

#### 2. Interconnection

The District's water system is currently interconnected to another WVAWC Bluefield. This study analyzed an interconnection with WVAWC Bluefield. The WVAWC Bluefield currently produces 1,250,000 gallons of water per day for customer demand. The WVAWC Bluefield existing water treatment plant has the capacity to produce 2,000,000 gallons of water per day. Considering Districts current average water demand of 550,000 gallons per day, WVAWC Bluefield has sufficient capacity to provide water through an interconnection.

Therefore, bringing the total amount of water treated at the WVAWC Bluefield treatment facility to:

$$1,250,000 \text{ GPD} + 550,000 \text{ GPD} = 1,800,000 \text{ GPD}$$

The total treated amount of 1,800,000 gallons per day is below the treatment capacity of 2,000,000 gallons per day. The WVAWC Bluefield is a reliable alternative water source for the District

#### 3. Treated Water Storage

The District's current treated water storage capacity for the system consists of four (4) water storage tanks totaling 652,000 gallons. On average, the water treatment plant produces 550,000 gallons per day. The maximum amount of water produced by the water treatment plant in a twenty-four (24) hour period from April 2014 to April 2015 was 876,000 gallons per day, according to monthly operating reports provided by the District.

Senate Bill 373 requires utilities to maintain a minimum required treated storage capacity equal to two (2) days of system storage based on the plant's maximum level of

production experienced within the past year. The minimum required treated water storage capacity for the system would be:

$$876,000 \text{ gallons per day } * 2 \text{ days} = 1,752,000 \text{ gallons}$$

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

$$1,752,000 \text{ gallons} - 652,000 \text{ gallons} = 1,100,000 \text{ gallons}$$

Therefore, the system currently does not meet the minimum required treated water storage capacity. Since storage tanks only come in standard sizes it was decided to propose a 1,260,000 gallon raw water storage tank. A cost analysis is provided in Appendix D, "Supporting Documentation".

### 4. Raw Water Storage

The District's water system raw water storage capacity for the system consists 94,000,700 gallons. The minimum required raw water storage capacity equal to two (2) days of system storage based on the plant's maximum level of production experienced within the past year.

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

$$876,000 \text{ gallons per day } * 2 \text{ days} = 1,752,000 \text{ gallons}$$

Therefore, the District has adequate amount of raw water storage.

Feasibility Matrix	Green Valley Glenwood	PWSID:	WV3302849	Date:	7/23/2015	Completed by:		Project Engine	er - The Thras	sher Group, Inc.	
Criteria	Question	Backup Intake	Feasibility	Interconnect	Feasibility	Treated Water Storage	Feasibility	Raw Water Storage	Feasibility	Other (Specify)	Feasibility
	Economic Criteria										
What is the total current budge	What is the total current budget year cost to operate and maintain the PWSU (current budget year)?			\$1,124,039.00		\$1,124,039.00		\$1,124,039.00		\$1,124,039.00	
	Describe the major O&M cost requirements for the alternative?	Labor, power and materials for maintenance	3	Labor, power and materials for maintenance	3	Labor and materials for maintenance	2	Labor and materials for maintenance	3		0
O and M Costs	What is the incremental cost (\$/gal) to operate and maintain the alternative?	\$0.00	3	\$0.00	3	\$0.00	2	\$0.00	3	\$0.00	0
	Cost comparison of the incremental O&M cost to the current budgeted costs (%)	\$0.00	3	0.00%	3	0.00%	2	0.00%	3	0.00%	0
	O and M-Feasibility Score		3.0		3.0		2.0		3.0		0.0
Describe the capit	al improvements required to implement the alternative.	Done		Done		Construction of a new 1,260,000 gallon treated water storage tank.		Done			
	What is the total capital cost for the alternative?	\$0.00	3	\$0.00	3	\$1,200,125.00	3	\$0.00	3	\$0.00	0
Capital Costs	What is the annualized capital cost to implement the alternative, including land and easement costs, convenience tap fees, etc. (\$/gal)	\$0.00	3	\$0.00	3	\$0.00	3	\$0.00	3	\$0.00	0
	Cost comparison of the alternatives annualized capital cost to the current budgeted costs (%)	0.00%	3	0.00%	3	106.77%	3	0.00%	3	0.00%	0
	Capital Cost-Feasibility Score		3.0		3.0		3.0		3.0		0.0
	Technical Criteria										
	Provide a listing of the expected permits required and the permitting agencies involved in their approval.	Done	3	Done	3	WV DEP, WV DNR, ACOE, WV SHPO, US FWS, WV DOH and County Floodplain	2	Done	3		0
Permitting	What is the timeframe for permit approval for each permit?	Done	3	Done	3	WV DEP (90 days), WV DNR (60 days), ACOE (90 days), WV SHPO (60 days), US FWS (60 days), WV DOH (90 days) and County Floodplain (90 days)	2	Done	3		0
	Describe the major requirements in obtaining the permits (environmental impact studies, public hearings, etc.)	None	3	None	3	Environmental impact studies.	2	None	3		0
	What is the likelihood of successfully obtaining the permits?	Good	3	Good	3	Good	2	Good	3		0
	Does the implementation of the alternative require regulatory exceptions or variances?	No	3	No	3	No	3	No	3		0
	Permitting-Feasibility Score		3.0		3.0		2.2		3.0		0.0
	Will the alternative be needed on a regular basis or only used intermittently?	Intermittently	3	Intermittently	3	Intermittently	3	Intermittently	3		0
Flexibility	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 impact	3	No impact	3	The alternative will add 1,260,000 gallons of treated water storage to the system, and will not have any other impact.	2	No impact	3		0
	Flexibility-Feasibility Score		3.0		3.0		<b>2.5</b>		3.0		0.0

Criteria	Question	Backup Intake	Feasibility	Interconnect	Feasibility	Treated Water Storage	Feasibility	Raw Water Storage	Feasibility	Other (Specify)	Feasibility
	Will the alternative provide any advantages or disadvantages to meeting seasonal changes in demand?	Yes	3	Yes	3	Yes	2	Yes	3		0
Resilience	How resistant will the alternative be to extreme weather conditions such as drought and flooding?	Drought may limit the availability of water.	3	None	3	None	3	Drought may limit the availability of water.	3		0
	Will the alternative be expandable to meet the growing needs of the service area?	Yes	3	Yes	3	Yes	3	Yes	3		0
	Resilience-Feasibility Score		3.0		3.0		2.7		3.0		0.0
	Identify any agreements or other legal instruments with governmental entities, private institutions or other PWSU required to implement the alternative.	None	3	An agreement with WVAWC will be required.	3	None	3	None	3		0
	Are any development/planning restrictions in place that can act as a barrier to the implementation of the alternative.	No	3	No	3	No	3	No	3		0
Institutional Requirements	Identify potential land acquisitions and easements requirements.	Done	3	Done	3	Done	3	Done	3		0
Instit	itutional Requirements-Feasibility Score Environmental Criteria		3.0		3.0		3.0		3.0		0.0
Environmental Impacts	Identify any environmentally protected areas or habitats that might be impacted by the alternative.	None are known.	3	None are known.	3	None are known.	3	None are known.	3		0
En	vironmental Impacts-Feasibility Score		3.0		3.0		3.0		3.0		0.0
Aesthetic Impacts	Identify any visual or noise issues caused by the alternative that may affect local land uses?	Done	3	Done	3	Construction would cause temporary noise issues, and some visual impact would be made by the tank.	2	Done	3		0
	Identify any mitigation measures that will be required to address aesthetic impacts?	Done	3	Done	3	The construction would need to be as quick as possible.	2	Done	3		0
	Aesthetic Impacts-Feasibility Score		3.0		3.0		2.0		3.0		0.0
	Identify the potential stakeholders affected by the alternative.	Done	3	Done	3	Water customers and land owners.	2	Done	3		0
Stakeholder Issues	Identify the potential issues with stakeholders for and against the alternative.	Done	3	Done	3	A rate increase may be required to implement construction, and possible land ownership issues may arise.	2	Done	3		0
	Will stakeholder concerns represent a significant barrier to implementation (or assistance) of the alternative?	No	3	No	3	No	2	No	3		0
	Stakeholder Issues-Feasibility Score		3.0		3.0		2.0		3.0		0.0
	Comments	Backup Intake with the	Shupe Reservoir	Has interconnection with Blue American Water S		The Glenwood Water Syster 652,000 gallons of treated wa does not meet the minimum Proposed 1,260,0	ter storage; that requirements.	Glenwood Reservoir med requirement		This alternative has already both OR No commo	

#### Matrix Explanation

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

Economic factors evaluated in the matrix include all information needed to fund the alternative source. The matrix considers the current utility budget available per the latest (2014) annual report, operation and maintenance costs for each alternative, and the capital needed to construct each alternative. Supporting documentation is included in Appendix D of the report which provides a breakdown of costs for each alternative that are used as capital costs in the matrix. The economic feasibility of each alternative is compared on a cost per gallon ratio. This ratio is determined by dividing the capital cost of the improvements by the total number of gallons of water produced per year. An average of the economic feasibility factors is then calculated and entered into the overall feasibility matrix found in Appendix B.

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

Environmental aspects for each alternative include impacts, aesthetics and stakeholders. Environmental impacts included any areas in the proposed alternative source area that are protected. Areas that are protected would have a low feasibility because the impacts could be large if the project were constructed. Aesthetics factors were noise, visual impacts and mitigation measures that could affect the projects feasibility. The aesthetic factors relate to the stakeholders factors. The stakeholders' portion of the environmental criteria involves the community and their acceptance of the new source alternative and the structures that will be constructed.

## **APPENDIX D - SUPPORTING DOCUMENTATION**

## **EARLY WARNING MONITORING COST ESTIMATE**

Q	ty.	Description	Unit Price	<b>Total Cost</b>
1	EA	Back Panel / Trough / Level (required)	\$ 4,350.00	\$ 4,350
1	EA	Probe Module SC1000 (6 sensors)	\$ 1,344.00	\$ 1,344
1	EA	Internal Card SC1000 (4 mA inputs)	\$ 879.00	\$ 879
1	EA	Display Module SC1000	\$ 2,770.00	\$ 2,770
1	EA	Conductivity Sensor	\$ 860.00	\$ 860
1	EA	FP360 SC Sensor, 500ppb, SS, 1.5 m Cable	\$ 17,480.00	\$ 17,480
1	EA	ORP Sensor	\$ 880.00	\$ 880
1	EA	pH Sensor, Ryton	\$ 800.00	\$ 800
1	LS	Installation	\$ 20,365.00	\$ 20,365
	•		TOTAL =	\$ 50,000

## **OPERATION & MAINTENANCE COST ESTIMATE**

Qty.		Description	Unit Price	<b>Total Cost</b>
1	1 LS Annual O&M Cost		\$ 750.00	\$ 750
			TOTAL =	\$ 750

In addition to the early warning system, the Greenvalley Glenwood Water Treatent Plant should establish a baseline water quality for their sources.

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

COSTS OF ADDITIONAL ITEMS AND ASSUMPTIONS				
Access Road and Site Preparation	\$	75,000		
Yard Piping and Vault		13%		
Bonds/Permits	\$	20,000		
Fencings	\$	35,000		
Engineering/Accounting/Legal Fees		25%		
Level-Sensing and Measuring Equipment	\$	10,000		
Rock Excavation of Foundation (if encountered)		5%		

**ASSUMPTIONS:** Cost are based on a standpipe glass lined tank. Price include access roads and site preparation (assuming land would need to be purchased for the tank site), telemetry, excavation in rock (% of Tank Cost), valve vault and piping (13% of tank Cost), fencing (Lump Sum). Does not include additional waterline from site to water system. Fees for engineering, legal and accounting services will be 25 percent of the overall project cost.

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

## **Generator Quotes**

Description	Quantity
Transfer Switch-Power Command: 1200A	
Transfer Switch-Onan,PwrCmd,1200 Amp	1
Transfer Mode-Delayed Transition	1
Poles-3	1
Application-Utility To Genset	1
Listing-UL 1008/CSA Certification	1
Frequency-60 Hertz	1
System-3 Phase,3 Wire Or 4 Wire	1
Voltage-480 Vac	1
Cabinet- Type 4	1
Control-Transfer Switch,Level 1	1
Switch,Key,Front Panel Security	1
Display-Digital	1
Auxiliary Relay-12 Vdc Coil-Installed Only	1
Auxiliary Relay-Switch In Emergency Position-12VDC	1
Auxiliary Relay-Switch In Normal Position-12VDC	1
Cable Lugs-Mechanical, 4-600MCM/Pole	1
Transfer Switch Warranty - Yr 0-2: Parts, Labor and Travel; Yr 3-5: Parts Only; Yr 6-10: Main Contacts Only	1
Packing-Wooden Crate	1
Common Parts Listing	1
Product Revision - D	1
Diesel Genset: 60Hz-800kW	
U.S. EPA, Stationary Emergency Application	1

Genset-Diesel,60Hz,800kW	1
Duty Rating-Standby Power	1
Listing-UL 2200	1
EmissionCert,EPA,Tier 2,NSPS CI Stationary Emergency	1
Enclosure-Steel,SndAtt,Level 2,Base Mtd,w/ExhSys	1
Fuel Tank-Subbase,2000 Gallon,UL142 Compliant	1
Voltage-277/480,3 Phase,Wye,4 Wire	1
Alternator-60Hz, Wye, 480 Volts, 105C (S)	1
SET CONTROL-PCC 2100	1
Display Language-English	1
Switch-Key, Control Operating Mode	1
Display-Control,Graphical	1
Meters-AC Output, Analog	1
Alarm-Audible, Engine Shutdown	1
Interface-CommunicationsNtwk,FTT-10	1
Stop Switch-Emergency,Externally Mounted	1
Control Mounting-Left Facing	1
CB or EB or TB-Left Only	1
CB-1200A,3P,600/690V,UL/IEC,ServEnt,100%UL,Left	1
CB or EB or TB-Bottom Entry, Left	1
Indication-Ground Fault, 3-Pole Xfr Sw, Rmt Mt CT	1
Enclosure Color-Green,Steel Enclosure	1
Listing, ULC-S601-07	1
Cooling Air Outlet-Horizontal ,Sound Attenuated	1
Louvers-Air Inlet,24VAC Motor Closed,Spring Opened	1
Louvers-AirOutlet,24VAC Motor Closed,Spring Opened	1
Distribution Panel-Prewired AC Features	1

	Total Cost \$213,768.00
On Site Customer Training	1
Start up Inspection	1
Batteries	2
On Site Four Hour Load Bank Test	1
Battery Charger. 10amp-120/208/240Vac (60/50Hz)	1
Product Revision - L	1
Common Parts Listing	1
Packing-Base Mtd Housing	1
Literature-English	1
ST 5YR 1500HR P + L + T	1
Test Record-Certified	1
Test Record-Safety Shutdowns	1
Test-Extended, Standby Load, 4 Hour	1
Engine Air Cleaner-Normal Duty	1
Coolant Heater-208/240/480V, Below 40F Ambient Temp	1
Shutdown-Low Coolant Level	1
Engine Cooling-Radiator, 50C Ambient	1
Fuel Tank Connection-Dual Stub Up	1
Separator-Fuel/Water	1
Enclosure Lighting-120 VAC	1



## **David Rollins**

Cummins Crosspoint, LLC Phone: (304) 769-1012 x 8321

## **APPENDIX E. SUPPORTING DOCUMENTATION**

Green Valley Glenwood PSD - Glenwood and Bulltail

February 29, 2016, 1:30 pm, PSD office, Maple Acres Road, Princeton.

Regularly scheduled PSD Board Meeting open to public, advertised in newspaper beforehand

#### Attendees:

- Marty Mariotti, General Manager
- John Poole, Field Manager
- James Carter, Board Member
- Greg Wimmer, Board Member
- · Jimmy W. Welch, Board Member
- John Parsons, Wastewater Treatment Plant Chief Operator
- John Beckman, Tetra Tech

Introduced source water protection timeline as it relates to Green Valley Glenwood PSD. Mentioned 2014 Charleston Water Crisis and new regulations that followed. Discussed contents of new, updated plan, including contingency plan, PSSC maps, and communication sections.

Summarized primary threats to existing intakes. Vehicle accident on Route 20 could affect Glenwood Lake. Canada geese are a long term problem for bacteria. Fishing access and sewer lift station are threats to Bulltail intake, but increased security and good management have reduced those risks.

Discussed schedule to decommission Bulltail. Intake at Bulltail will be retained as a backup in the near future. New intake at Dan Hale Reservoir and water plant expansions are out to bid at this time. Glenwood Lake intake would be retained as a backup indefinitely.

Discussed how to comply with new requirement to inform public 30 minutes after discovering a problem with source water. Board member James Carter requested specific guidance from the DHHR concerning new rules on public notification. Boil water alerts currently go through county health department. Health department alerts media. Discussed possibility of implementing cell phone text message system, voice and text enabled phone tree, or social media such as Facebook to broadcast alerts.

Discussed preventable nature of Charleston Water Crisis and current lead contamination of drinking water in Flint, Michigan.

Green Valley Glenwood PSD is in a good position to deal with a source water crisis. When the new intake on Dan Hale is complete, they will have three intakes on different bodies of water, plus an emergency interconnection with Bluefield WVAWC.

