FOR PUBLIC RELEASE

Source Water Protection Plan
Charles Town Utilities

PWSID: WV3301905

Jefferson County

April 2024

Prepared By:

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Utility General Manager

In cooperation with Charles Town Utilities

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

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

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

John Nissel

Name of Authorizing Signatory:

Chairman

Title of Authorizing Signatory:

Date of Submission (mm/dd/yyyy):

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SOURCE WATER PROGRAM ACRONYMS

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

1.0 PURPOSE

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

The intent of this document is to describe what Charles Town Utilities 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, Charles Town Utilities acknowledges that implementing measures to minimize and mitigate contamination can be a relatively economical way to help ensure the safety of the drinking water.

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

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

2.0 BACKGROUND: WV SOURCE WATER ASSESSMENT AND PROTECTION PROGRAM

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

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

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

3.0 STATE REGULATORY REQUIREMENTS

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

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

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

4.0 SYSTEM INFORMATION

CHARLES TOWN UTILITIES 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 CHARLES TOWN UTILITIES

Administrative office location:	661 S George Street, Suite 101, Charles Town, JEFFERSON, WV, 25414		
Is the system a public utility, according to the Public Service Commission rule?	Yes		
Date of Most Recent Source Water Assessment Report:	7/1/2004		
Date of Most Recent Source Water Protection Plan:	10/2021		
Population served directly:	18,171		
Bulk Water Purchaser Systems:	System Name	PWSID Number	Population
Total Population Served by the Utility:	18,171		
Does utility have multiple Source Water Protection Areas(SWPAs)?	No		
How many SWPAs does the utility have?	1		

5.0 WATER TREATMENT AND STORAGE

As required, Charles Town Utilities 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 Charles Town Utilities 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. Charles Town Utilities Water Treatment Information

Charles Town Utilites	
Water treatment processes (in order of occurrence) includes:	COAGULATION, FILTRATION, DISINFECTION (CHLORAMINATION), FLUORIDATION
The treatment capacity is approximately (GPD):	3,000,000
Current average production is approximately (GPD):	1,656,000
Maximum gallons of water treated and produced at that plant in one day during the past year was:	1,980,000
Minimum gallons of water treated and produced at that plant in one day during the past year was:	1,327,000
Plant is operated an average of hours a day:	14
Maximum number of hours of operation in one day at that plant during the past year was:	16.8
Minimum number of hours of operation in one day at that plant during the past year was:	12
How many storage tank(s) are maintained on systems distribution system:	7
Total gallons of treated water storage:	3,572,000
Total gallons of raw water storage (GALs):	0

Table 3. Charles Town Utilities Surface Water Sources

Intake Name	Facility #	Local Name	Describe Intake	State Id Code	Date Constructed / Modified	Frequency of Use (Primary / Backup / Emergency)	Activity Status (Active/Inactive)
SHENANDOAH RIVER INTAKE	3490888	INTAKE #1	Standard Johnson Screen - 24 inch (Stainless Steel). T-Shaped Intake	IN001	1/1/1989	Permanent	Active

Table 4. Charles Town Utilities Ground Water Sources

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

6.0 DELINEATIONS

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

The WSDA includes the entire watershed area upstream of the intake to the boundary of the State of West Virginia border, or a topographic boundary. The ZCC for a public surface water supply is a corridor along streams within the watershed that warrant more detailed scrutiny due to its proximity to the surface water intake and the intake's susceptibility to potential contaminants within that corridor. The ZCC is determined using a mathematical model that accounts for stream flows, gradient and area topography. The length of the ZCC is based on a five-hour time-of-travel of water in the streams to the water intake, plus an additional one-quarter mile below the water intake. The width of the zone of critical concern is 1,000 feet measured horizontally from each bank of the principal stream, and five hundred feet measured horizontally from each bank of the tributaries draining into the principal stream. Ohio River ZCC delineations are based on ORSANCO guidance and extend 25 miles above the intake. The Ohio River ZCC delineations include 1,320 feet (1/4 mile) measured from the bank of the main stem of the Ohio River and 500 feet on a tributary.

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

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

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

Table 5. Watershed Delineation Information

Intake Name	Shenandoah River
Size of WSDA (Square Miles)	3009
River Watershed Name (8-digit HUC)	Shenandoah - 02070007
Size of Zone of Critical Concern (Acres)	8691
Size of Zone of Peripheral Concern (Acres) (Include ZCC area)	13807
Do you blend with ground water	No
Do you have an intake or well/spring missing from the list?	No

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 Charles Town Utilities 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.

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

Table 6. Protection Team Member and Contact Information

Name	Representing	Title	Phone Number	Email
Kristen Stolipher	Charles Town Utilities	Utility Manager	(304)724-3280	kstolipher@ctubwv.com
Chris Hutzler	Charles Town Utilities	Chief Operator	(304)725-3761	chutzler@ctubwv.com
Stephen Allen	Jefferson County Office of Homeland Security and Emergency Services	Director	(304)728-3329	sallen@jeffersoncountywv.org
Mike Sine	Jefferson County Emergency Services Agency	Director	(304)725-3287	msine@jcesa.org
Jeff Polczynski	Jefferson County Emergency Communications Center	Director	(304)728-3317	jpolczynski@jeffersoncountywv. org
Chris Cross	Jefferson County Emergency Communications Center	Deputy Director	(304)728-3372	ccross@jeffersoncountywv.org
Jessica Gormont	Jefferson County GIS Department	GIS Coordinator	(304)724-8986	jgormont@jeffersoncountywv.org
Mason Carter	Jefferson County Floodplain Ordinance Coordinator	Floodplain Coordinator		mcarter@jeffersoncountywv.org
Chief	Citizens Fire Department	Chief	(304)725-2814	
Adam Watson	Independent Fire Department	Chief	(304)725-2514	ifc@independantfirecompany.net
Alana Hartman	WVDEP Div of Water & Waste Management (Nonpoint Section)	Environmental Resources Analyst	(304)822-7266	alana.c.hartman@wv.gov
Justin Jordan	WVDHHR Kearneysville District Office	Representative	(304)725-9453	justin.e.jordan@wv.gov
Mitchell McAdoo	USGS Virginia & West Virginia Water Science Center	Hydrogeologist	(304) 347-5130	mmcadoo@usgs.gov

Dewberry Engineers Inc.	Richard Kinchloe	Consultant for Charles Town Utilities	(804)823-6980	rkinchloe@dewberry.com
Lew Baker	WV Rural Water Association	FSA Sourcewater Specialist	(304)638-9883	lewbaker@wvrwa.org
Jennifer O'Brien	Eastern Panhandle Regional Planning & Development Council	Assistant Director	(304)263-1743	jobrien@region9wv.com
Maria Russo	WV Rivers Coalition	Representative	(304)433-7376	mrusso@wvrivers.org
Karen Andersen	Friends of the Shenandoah	Representative		kandersen@fors.org
Karen Bencala	ICPRB	Senior Water Resources Planner	(301)984-1908	kbencala@icprb.org
Efforts made to inform and engage local stakeholders (public, local government, local emergency planners, local health department, and affected residents) and explain absence of recommended stakeholders		The first meeting to notify the public of the draft will be held on April 10, 2024. The second meeting and public hearing will be held on April 24, 2024.		

8.0 POTENTIAL SOURCES OF SIGNIFICANT CONTAMINATION

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

The list of PSSCs located in the SWPA is organized into two types: 1) SWAP PSSCs, and 2) Regulated Data. SWAP PSSCs are those that have been collected and verified by the WVBPH SWAP program during previous field investigations to form 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 from 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. In the event of a chemical spill, release or other related emergency, information pertaining to the contaminant shall be immediately disseminated to any emergency responders reporting to the site. The designees for Charles Town Utilities are identified in the communication planning section of the source water protection plan.

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

8.2. LOCAL AND REGIONAL PSSCS

For the purposes of this source water protection plan, local PSSCs are those that are identified by 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.

The Charles Town Utilities 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 Charles Town Utilities and not already appearing in datasets from the WVBPH can be found in .**Table 7**.

Table 7. Locally Identified potential Sources of Significant Contamination

Please see Appendix A to view this information.

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 these priority PSSCs was selected and ranked by the Charles Town Utilities 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.

8.4. CTUB PFAS Monitoring & Prevention

The EPA recently announced final updated MCLs for 5 PFAS chemicals (PFOA, PFOS, PFNA, PFHxS and HFPO - DA). Following the United States Geological Survey (USGS) Source Water Study of PFAS in 2020, it has been proven that PFAS contamination is present in the Eastern Panhandle of West Virginia. CTUB takes a proactive stance on responses to PFAS contamination and actively monitors for PFAS chemicals and remains up to date with new regulations regarding MCLs and PFAS contamination prevention methods.

9.0 IMPLEMENTATION PLAN FOR MANAGEMENT STRATEGIES

Charles Town Utilities 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. CTUB will aim to initiate annual meetings with the Protection Team. Meeting minutes of any annual meetings will be placed on the CTUB website.

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. Charles Town Utilities 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.

Table 8. Priority PSSCs or Critical Areas

PSSC or Critical Area	Priority Number	Reason for Concern
Agricultural Landuses	1	Pesticides and other chemicals used for farm operations 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. Increased nutrient load from these sources in surface water may result in algal growth. Algal presence may result in taste and odor issues. If stressed some algae also releases toxic chemicals that could cause a threat to human health.
Industrial & Commercial Activity	2	Facilities such as gas stations, auto repair shops, and dry cleaners are located within the SWPA and pose a threat due to the potential for accidental spills, leaks, improper disposal of hazardous waste or improperly managed storm water runoff.
Boat Ramp	3	The WV Division of Natural Resources (WVDNR) Shannondale Springs Wildlife Management Area (WMA) has a boat ramp within the ZCC on a tributary upstream of the intake. Petroleum products from boats may contaminate the surface waters.
Railroad Traffic	4	The railroad tracks run through the protection watershed and cross 2 tributaries within the ZCC. A spill or leak could contaminate the source water.
On-Site Septic Systems	5	Failing septic systems or untreated sewage from on-site septic systems could infiltrate to the surface water source, raising concentrations of total coliform, particularly fecal coliform.
New Development Construction	6	Construction runoff from new development can increase turbidity, total dissolved solids, and total suspended solids in the surface waters. Petroleum products from construction equipment could migrate into surface waters should a spill or leak occur.
Land Conservation within the Watershed.	7	Land conservation is critical to the over health of the Shenandoah River and its tributaries. Forests lands and wetlands are vital along the routes of waterways. Restoring areas along the river to native habitats acts to filter water, stops siltation and recharges aquifers. Also, land conservation increases aquatic wildlife and access for recreation.

Table 9. Priority PSSC Management Strategies

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status / Schedule	Comments	Estimated Cost
Boat Ramp	Contact personnel of the WVDNR Shannondale Springs WMA to identify any measures that the water system can assist to promote keeping the water free of petroleum products associated with boats.	Charles Town Utility Board	Not Started		Personnel Time

Table 9. Priority PSSC Management Strategies

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status / Schedule	Comments	Estimated Cost
Land Conservation within the Watershed.	Charles Town Utilities will focus on the connection between land conservation and source water protection. We will collaborate with conservation organizations like WV Rivers Coalition, WV Land Trust, the Farmland Protection Board, Land Trust of the Eastern Panhandle, Historic Landmark Commissions, and others to explore strategies to accelerate conservation easements that benefit our public drinking water source. The resulting management strategy will be a collaborative effort to identify priority conservation areas.	Lead: WV Rivers Coalition Charles Town Utility Board	Ongoing	Meet with WV Rivers Coalition to discuss opportunities	Minimal, staff time to attend meetings
Industrial & Commercial Activity	Charles Town will request Groundwater Protection Plans (GPPs) and/or stormwater management plans from WVDEP for commercial facilities located within the SWPA. Review and investigate what (if any) preventative pollution measures are already in place for these facilities. This will permit the utility to better understand protection strategies already in place at these facilities and more accurately determine the threat posed by specific facilities.	Charles Town Utility Board	Ongoing		Personnel Time
Agricultural Landuses	Pesticides, herbicides and nutrients used for farm operations can migrate through surface waters into the water supply. Non-point source runoff from the livestock areas may introduce pathogens, particularly if the runoff occurs from confined spaces, such as feedlots. Overgrazing can create erosion issues. Areas used for disposal of animal waste or burying dead livestock can also cause contamination of the source water.	Charles Town Utility Board	Ongoing		Personnel Time

Table 9. Priority PSSC Management Strategies

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status / Schedule	Comments	Estimated Cost
Agricultural Landuses	Consider working with the local Future Farmers of America members to distribute educational materials and best management practices information.	n/a	Not Started		
Agricultural Landuses	Work with the local livestock owners to determine the placement of animal waste disposal areas and/or areas for burying dead livestock.	n/a	Not Started		
Railroad Traffic	When CSX railways offers or provides training materials, planning guides, trainings, exercises, etc., to the LEPC, Jefferson County LEPC will make the information available to local emergency response agencies so that they may choose to utilize them. CSX has made their Rail Respond internet-based program available to HSEM, LEPC, and emergency responders that can document to CSX a need to know, which provides access to critical information about response to accidents involving the CSX rails. Emergency personnel have also expressed interest to CSX in performing routine Emergency Response drills for Highway and Railroad spills. Charles Town Utilities will work with WVDEP of BPH to perform a Hazmat Re-route request to prevent specific potential contaminants from being transported through system source water protection areas. These entities will work with railroad companies to discuss safety measures, emergency plans and inspection routine(s).	Charles Town Utility Board, Jefferson County Homeland Security and Emergency Management, WVDEP, WVBPH	Ongoing		Personnel Time
Railroad Traffic	Work with the railroad company to create an emergency response plan in case a hazardous materials spill would occur to prevent or cleanup contamination of the source water.	n/a	Not Started		

Table 9. Priority PSSC Management Strategies

PSSC or Critical Area	Management Activity	Responsible Protection Team Member	Status / Schedule	Comments	Estimated Cost
New Development Construction	Ensure sediment and erosion control measures are being instituted at construction sites. Monitor compliance with existing regulations through inspections and/or contact with regulatory agencies (WVDEP).	Charles Town Utility Board	Ongoing		Personnel Time
On-Site Septic Systems	Charles Town Utilities will work with the Health Department to the degree feasible to encourage homeowners to maintain and routinely inspect their septic systems or replace old or failing septic systems with Best Available Technologies (BATs). Outreach materials will encourage them to have their septic system inspected regularly and pumped every 5-10 years as needed. Also, the USEPA provides a complete guide for residents to maintain their septic systems, for the guide, visit: http://epa.gov/own/septic/pubs/homeownerguide long.pdf.	Charles Town Utility Board, Jefferson County Health Department, WVDEP-DWWM	Ongoing		Personnel Time

10.0 EDUCATION AND OUTREACH STRATEGIES

The goal of education and outreach is to raise awareness of the need to protect drinking water supplies and build support for implementation strategies. Education and outreach activities will also ensure that affected citizens and other local stakeholders are kept informed and provided an opportunity to contribute to the development of the source water protection plan. Charles Town Utilities 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
Jefferson County Water Advisory Committee Participation	A representative from Charles Town Utilities will participate in the Jefferson County Water Advisory Committee. County Cleanup days, outreach, Shepherdstown day, 7 watershed groups coordinated	Charles Town Utilities	Ongoing	The Jefferson County Water Advisory Committee does not currently have a quorum. CTUB will monitor this Committee's activity and work to collaborate on regional Water issues once they reconvene.	
Emergency Planning and Coordination	Participate with local fire departments and County Emergency Services on a regular basis. This will ensure that all the agencies are in constant communication with one another and prepared in the event of an emergency.	Jefferson County Office of Homeland Security and Emergency Management Citizens and Independent Fire Departments Charles Town Utilities	Ongoing	On-going training exercises by emergency services.	Minimal, staff time to attend meetings.
Clean Up Events	Coordinate with local Clean Up efforts and publicize projects. Work closely with Watershed Associations in this regard.	Charles Town Utilities	Not Started	Coordinate with local organizations and publish information on web page	
General Information Dissemination	Include educational information on the following topics on website for public use: Source water protection, water conservation, household hazardous materials disposal, pharmaceuticals disposal, observing and reporting spills/leaks.	Charles Town Utilities	Ongoing	Annual CCR	
Best Management Practices (BMP) lists	Distribute lists of industry specific BMPs to the owners of (1) Gas Stations, (2) Car Repair Shops, (3) Agricultural Lands/Facilities within the SWPA (Future Farmers, etc.) Provide SWPP education materials.	WVDEP and WVDHHR Charles Town Utilities	Not Started	Charles Town can make this information available via web links on their web page	

Table 10. Education and Outreach Implementation Plan

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status / Schedule	Comments	Estimated Cost
Display Information	(1) Include information materials (i.e. brochures, maps, etc.) in County and City Government offices and other public places (i.e. local fairs). Work with DOT for protection area sign expansion/coverage. (2) Host non-confidential SWPP online for public review and comment.	Jefferson County Office of Homeland Security and Emergency Management. Citizens and Independent Fire Departments Charles Town Utilities	Ongoing	On-going training excercises by emergency services	
School Curricula	Work with area schools to include source water protection information into the curriculum, or present information at assemblies or in classroom events (e.g. environmental science class). Consider implementing in conjunction with City and County MS4 requirements.	WVDEP/WVDHHR Charles Town Utilities	Not Started	Coordinate with local organizations and publish information on web page	
School Curricula	In addition, the USEPA offers free educational materials for teachers and students, including classroom lessons, fact sheets, and interactive games and activities, for grades K-12. These materials can be accessed at the following websites. For general source water protection: http://www.epa.gov/safewater/kids/index.html. For water conservation: http://www.epa.gov/watersense/resources/educational_materials.html Similar protection and conservation related resources can be found at the Groundwater Foundation website; http://www.groundwater.org/kc/kc.html."	n/a	Not Started		
School Curricula	Visit school or invite students for a plant tour to tie in with school curricula.	n/a	Not Started		

Table 10. Education and Outreach Implementation Plan

Education and Outreach Strategy	Description of Activity	Responsible Protection Team Member	Status / Schedule	Comments	Estimated Cost
School Curricula	Ask the school to include message in school newsletter to raise awareness about source water protection and conservation.	n/a	Not Started		
Public-Private Partnerships	Work in concert with private partnerships such as WV Rivers Coalition to implement programs like Safe Water for West Virginia. This program would include outreach to landowners to promote land conservation within the ZCC, ZPC and water shed to better improve overall water quality.	West Virginia Rivers Coalition	Ongoing	WV Rivers should take the lead on this item and implement a schedule moving forward.	Minimal, staff time to attend meetings.

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 Charles Town Utilities is provided in **Table 11**.

11.1. RESPONSE NETWORKS AND COMMUNICATION

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

Table 11. Charles Town Utilities Water Shortage Response Capacity

Can the water utility isolate or divert contamination from the intake and groundwater supply?	Yes
Describe the results of an examination and analysis of the public water system's ability to isolate or divert contaminated waters from its surface water intake or groundwater supply:	Isolation by electronically closing the drop gate of the intake to the wet well. Using the ICPRB real time tool, Charles Town is informed of contaminant migration from upstream via real time modeling. The ICPRB is capable of determining time of travel of contaminants to the Charles Town intake. This will allow them to plan when to shut down the drop gate of the intake to isolate and keep the system from taking in potential contaminants. In addition, they have an 1800 gpm trash pump that can be manually placed into the Shenandoah River with the suction approximately 20 feet from shore if the contaminants are not near the shore line.
Describe the results of an examination and analysis of the public water system's existing ability to switch to an alternative water source or intake in the event of contamination of its primary water source:	Potentially. Using the 1800 gpm portable trash pump the Utility can establish a temporary intake in the Shenandoah Rover close to the shoreline near the wet well. The utility currently has this capability, and exercises it during periods of frazil ice or heavy organic leaf buildup on the intake structure.
Is the Utility able to close the water intake in the event of a spill?	Yes
How long can the Utility keep the intake closed?	Approximately 2.16 days (1,656,898 gpd average production, with current storage capacity of 3,572,000 gallons of treated water.
Describe the process to close the intake:	The intake pumps can be shut down and the intake structure has a drop gate that can be closed electronically from the treatment plant.
Describe the treated water system's storage capacity of the water system:	[redacted]
Gallons of storage capacity (raw water)	0
Gallons of storage capacity (treated water)	0
Is the Utility a member of WVRWA Emergency Response Team?:	No
Is the Utility a member of WV-WARN?:	Yes
List other agreements to provide receive assistance in case of emergency:	N/A

11.2. OPERATION DURING LOSS OF POWER

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

Table 12. Generator Capacity

Can you connect to a generator at the intake/wellhead?:		Yes	
Please provide a scenario that best describes your system:		Has standby generator, hard-wired and read to turn on. 3 phase Cummins 250 KW Model DQAC 1403873 Seriel # D140667237 (Spec H)	
What do you have (KW)?		250.00	
What do you need (KW)?		250.00	
Can you connect to a generator at the treatment facility?:		Yes	
Please provide a scenario that best describes your system:		Has standby generator, hard-wired and read to turn on. 3 phase Cummins 300 KW Model DQDAC 1344640 Serial# A140620402 (Spec G)	
What do you have (KW)?		300.00	
What do you need (KW)?		300.00	
Can you connect to a generator at the distribution system?:		Yes	
Please provide a scenario that best describes your system:		Has standby generator, hard-wired and read to turn on. Huntfield Booster Station 3 phase Cummins 100 KW, Northern High Zone Booster Station (Ranson) 3 phase Cummins 200 KW, Model DFGC2784250 Serial #L060003643 (Spec N), 1800 gpm trash pump (emergency pump)	
What do you have (KW)?		100.00	
What do you need (KW)?		100.00	
Does the utility have fuel on hand for generator?:		Yes	
Hours:		179	
Gallons:		550	
Provide a list of suppliers and alternate suppliers that could provide fuel in the event of an emergency:		Supplier	Phone Number
	Fuel	Roach Oil	(304)263-3329
	Fuel	Griffith Energy Services, Inc.	(240)416-2830
	Generator	WV National Guard	(304)267-2772
Does the utility test the generator(s) periodically?:		Yes	
Does the utility routinely maintain the generator(s)?:		Yes	
If the Utility does not have generator or the ability to connect to a generator, describe plans to respond to power outages:		In the event of a mechanical failure to the existing generators during an emergency, the system would need to obtain a Cummins Repair Technician, or obtain an equivalent emergency generator from a rental vendor or the National Guard, In the event another generator would be needed, an electrician would need to wire a the replacement generator into the system.	

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. Charles Town Utilities 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 Charles Town Utilities

Is the Utility able to meet water demands with the current capacity for the next five years?	Yes
Explain how you plan to do so:	Yes, there is enough capacity to support more residential, commercial and industrial development within the service area. The following explains how this can be achieved: 1. The water plant can increase daily production hours (currently running at approximately 13.50 hours/day) to increase total water production for near future expansion needs. 2. With capital improvements to the water delivery system, the total amount of fresh water on hand will increase as the replacement piping projects continue. Thus, increasing available fresh water and future expansion.

11.4. WATER LOSS CALCULATION

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

To further clarify, metered usages are most often those that are distributed to customers. Non-metered usages that are being estimated include usage by fire departments for fires or training, un-metered bulk sells, flushing to maintain the distribution system, and water used for backwashing filters and cleaning settling basins. By totaling the known metered and non-metered uses the utility calculates unaccounted for water. Note: To complete annual reports submitted to the PSC, utilities typically account for known water main breaks by estimating the amount of water lost. However, for the purposes of the source water protection plan, any water lost due to leaks, even if the system is aware of how much water is lost at a main break, is not considered a use. Water lost through leaks and main breaks cannot be controlled during a water shortages or other emergencies and should be included in the calculation of percentage of water loss for purposes of the source water protection plan. The data in **Table 13** is taken from the most recently submitted Charles Town Utilities PSC Annual Report.

Table 14. Water Loss Information

Water pumped - Total Gallons:		590,272,000
*Water purchased - Total Gallons:		0
Total gallons of water pumped and purchased:		590,272,000
Total gallons of water loss accounted for except main leaks:	Mains, plaint, filters, flushing, etc - Total Gallons:	50,000
	Fire department - Total Gallons:	20,000
	Back washing - Total Gallons:	18,500

	Blowing settling basins - Total Gallons:	15,000
Total Accounted for Water Loss		188,500
Unaccounted for lost water - Total Gallons:		39,876
Water sold - Gallons:		361,896,000
Water Lost From Main Leaks:		85,000
Total Gallons of Unaccounted for Lost Water and Water Lost from Main Leaks:		124,876
Total percent unaccounted for water		6.76%
Describe the measures to correct water loss greater than 15%:	The utility is continuing with planned capital improvements of approximately $5,000,000. The improvements consist of replacing piping in the older sections of the water system.	

11.5. EARLY WARNING MONITORING SYSTEM

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

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

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

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

Table 15. Early Warning Monitoring System Capabilities

Does your system currently receive spill notifications from a state agency, neighboring water system, local emergency responders, or other facilities?			Yes
From whom do you receive notices?			Notifications are received from the WVDEP, WVDHHR and the WV Office of Homeland Security and Emergency Management. In addition the state of Virginia provides notifications as well as the Interstate Commission on the Potomac River Basin (ICPRB).
Are you aware of any facilities, land uses, or critical areas within your protection areas where chemical contaminants could be released or spilled?			Yes
Are you prepared to detect potential contaminants if notified of a spill?			Yes
List laboratories (and contact information) on whom you would rely to analyze water samples in case of a reported spill.	Laboratories		
	Name	Phone Number	
	Pace Analytical Services - Rapid Response Line	(877)859-7778	
	HydroChem Laboratories	(304)725-6174	
Do you have an understanding of baseline or normal conditions for your source water uality that accounts for seasonal fluctuations?			Yes
Does your utility (aside from turbidity monitoring) currently monitor your raw water through continuous monitoring at the surface water intake or groundwater source to detect changes in water quality that could indicate contamination?			Yes
Does your utility collect periodic grab samples (ex. possess reserved sample bottles, on-call laboratory services, and trained personnel) in response to a spill notification or to investigate changes in water quality that could indicate contamination?			Yes
Please explain:			Continuously test for turbidity in raw water and chlorine levels in finished water with HACH equipment. Daily grab samples for pH, turbidity, temperature, total organic carbon, alkalinity and hardness; monthly grab samples for cryptosporidium and E. Coli are being collected, yearly periodic grab for nitrate, nitrite, VOCs, SVOCs and Metals.
Provide or estimate the capital and O&M costs for your current or proposed early warning system or upgraded system.	Capital Cost:		15,000
	O&M Cost:		3,000
Do you serve more than 100,000 customers?			No
Does your system currently receive spill notifications from a state agency, neighboring water system, local emergency responders, or other facilities?			Yes
Are you prepared to detect potential contaminants if notified of a spill?			Yes
Please describe the methods you use to monbitor at the same technical levels utilized by ORSANCO:			

12.0 SINGLE SOURCE FEASIBILITY STUDY

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

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

13.0 COMMUNICATION PLAN

Charles Town Utilities 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. Charles Town Utilities 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 Charles Town Utilities is attached as **Appendix C** for internal review and planning purposes only.

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

14.0 EMERGENCY RESPONSE

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

15.0 CONCLUSION

This report represents a detailed explanation of the required elements of Charles Town Utilities'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.

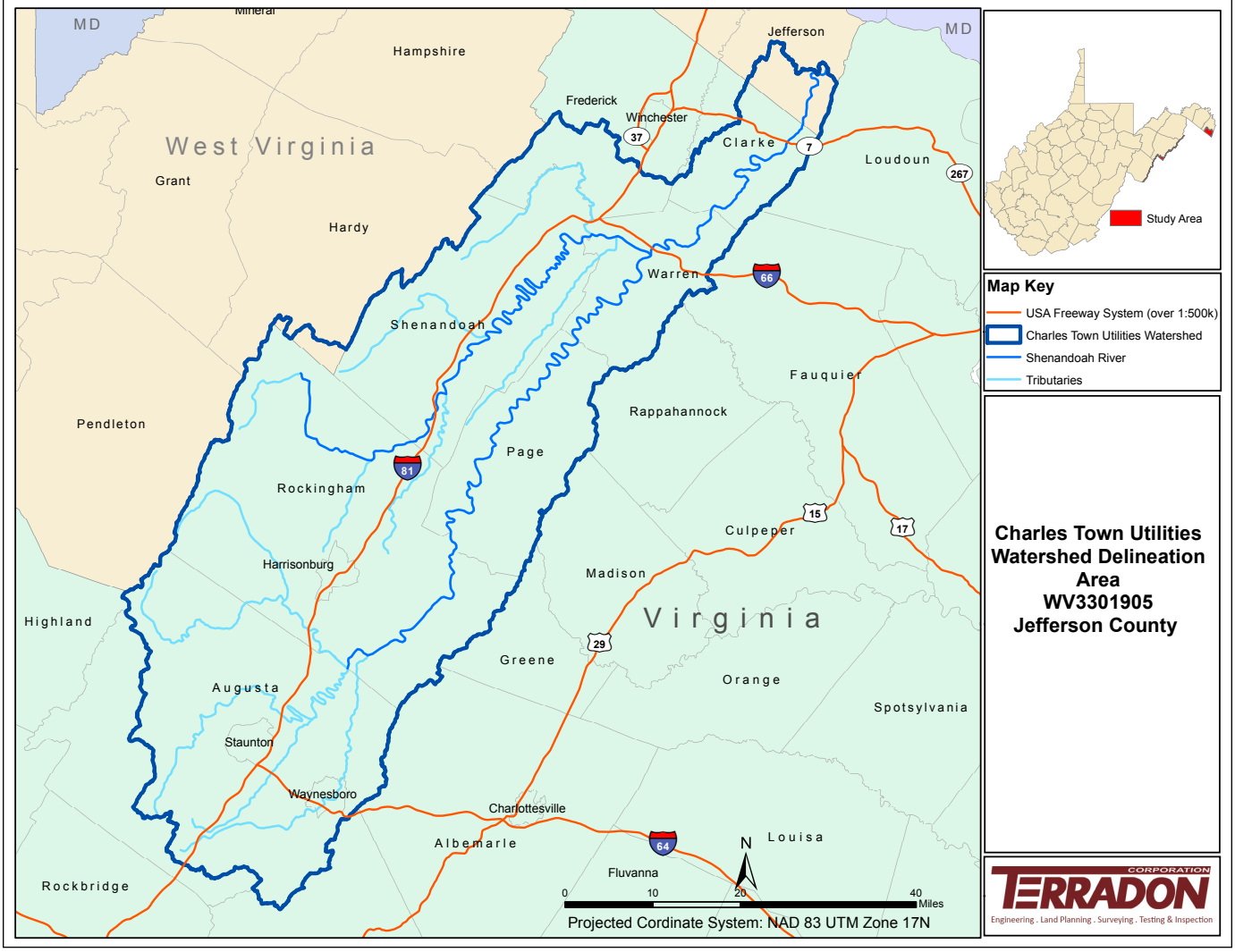
APPENDIX A. FIGURES AND TABLES

Water Source / Delineation

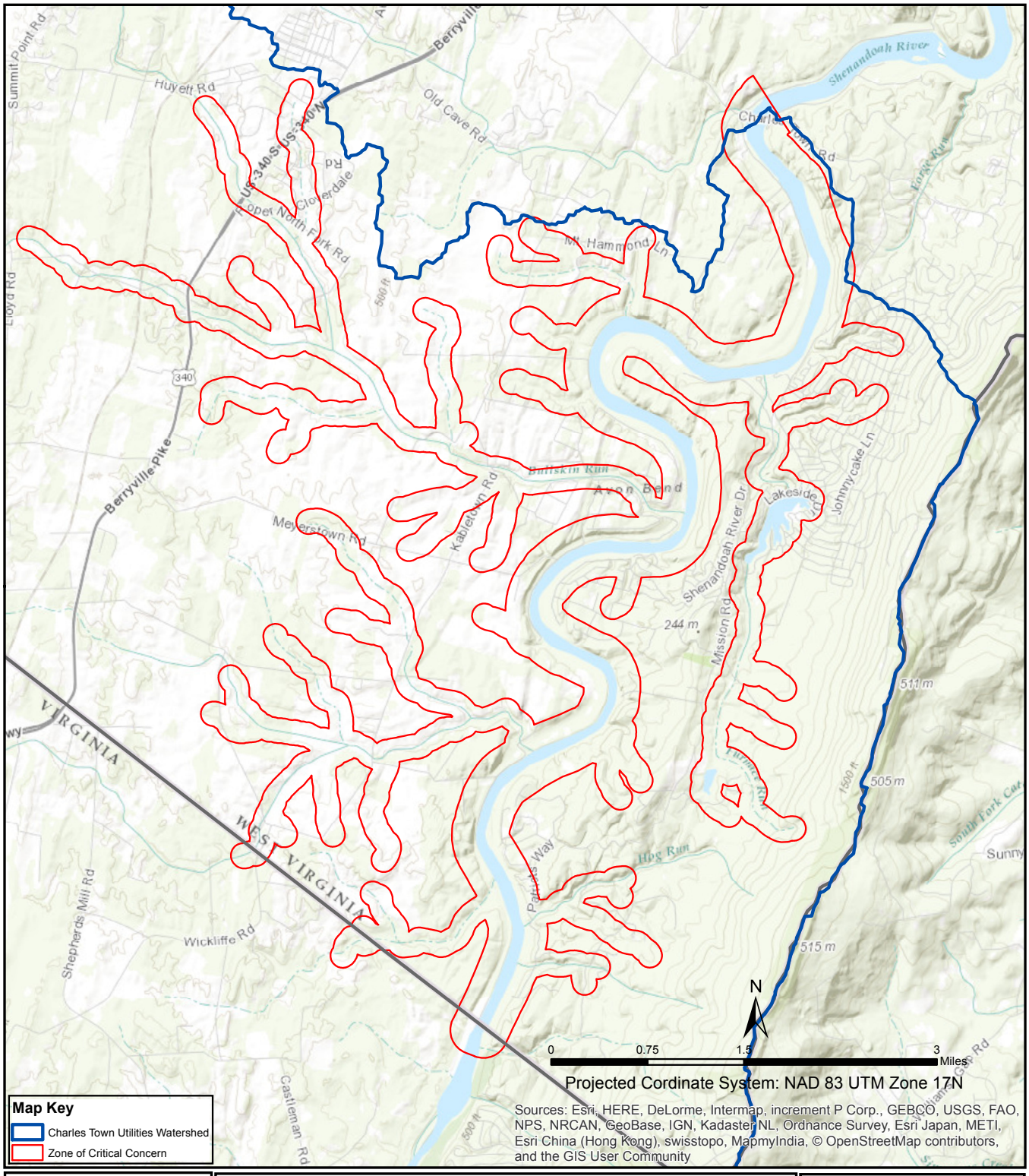
Surface Water Sources

Intake: Shenandoah River

Map of watershed delineation area



Map of zone of critical Concerns



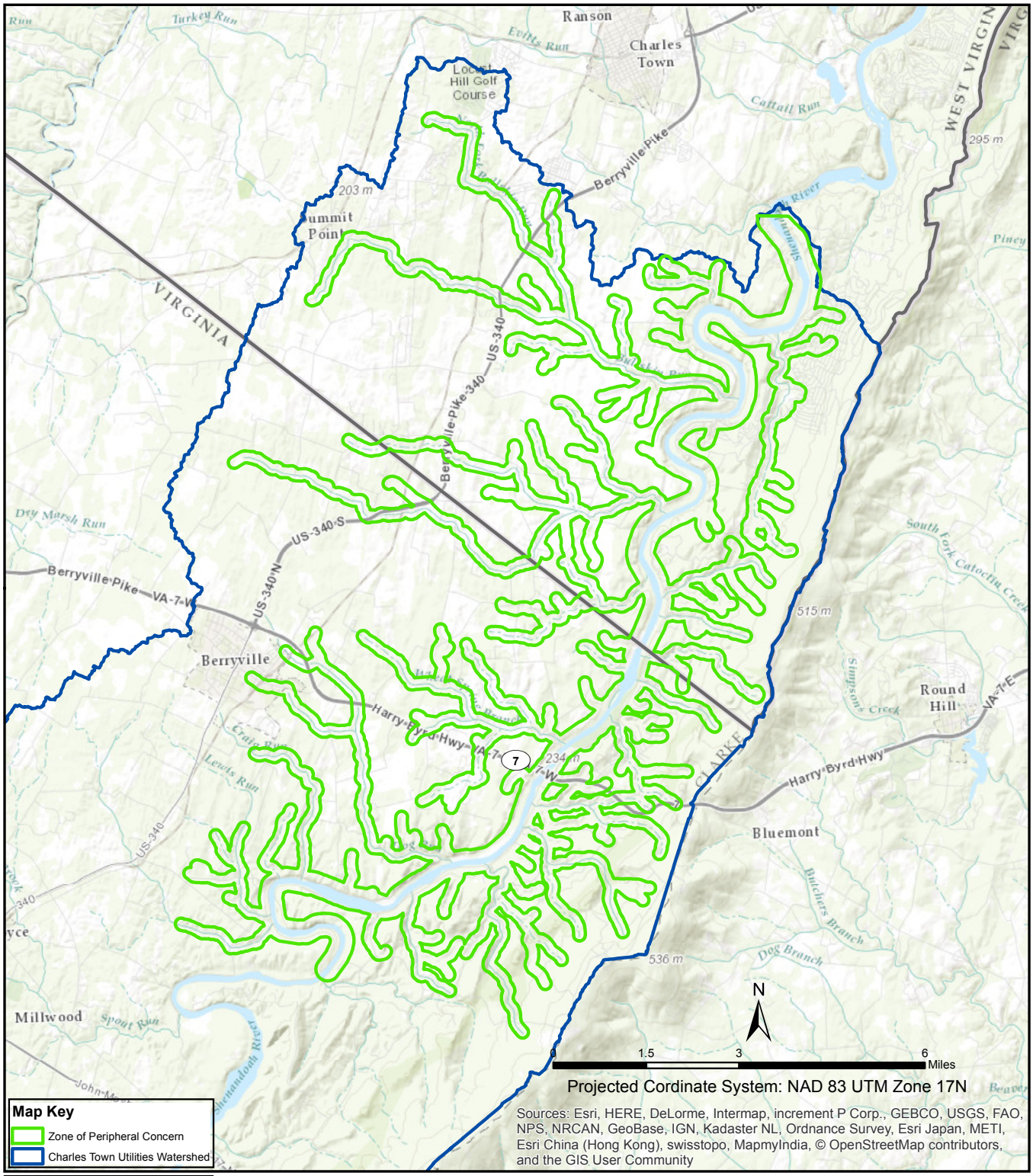
Charles Town Utilities Zone of Critical Concern

WV3301905

Jefferson County

TERRADON CORPORATION
Engineering . Land Planning . Surveying . Testing & Inspection

Map of zone of peripheral Concerns



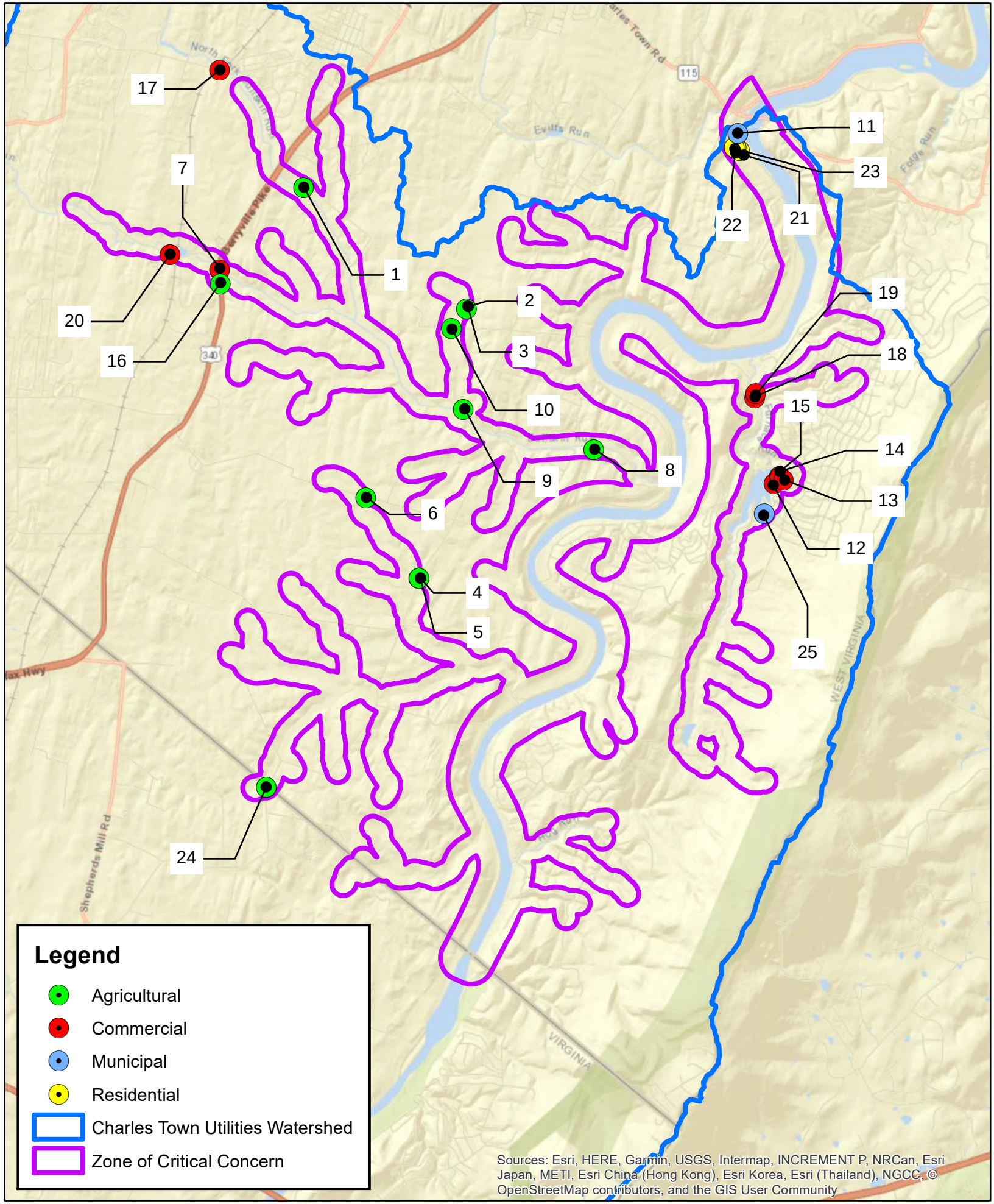
Charles Town Utilities Zone of Peripheral Concern

WV3301905

Jefferson County

TERRADON CORPORATION
Engineering . Land Planning . Surveying . Testing & Inspection

PSSC Maps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14
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12
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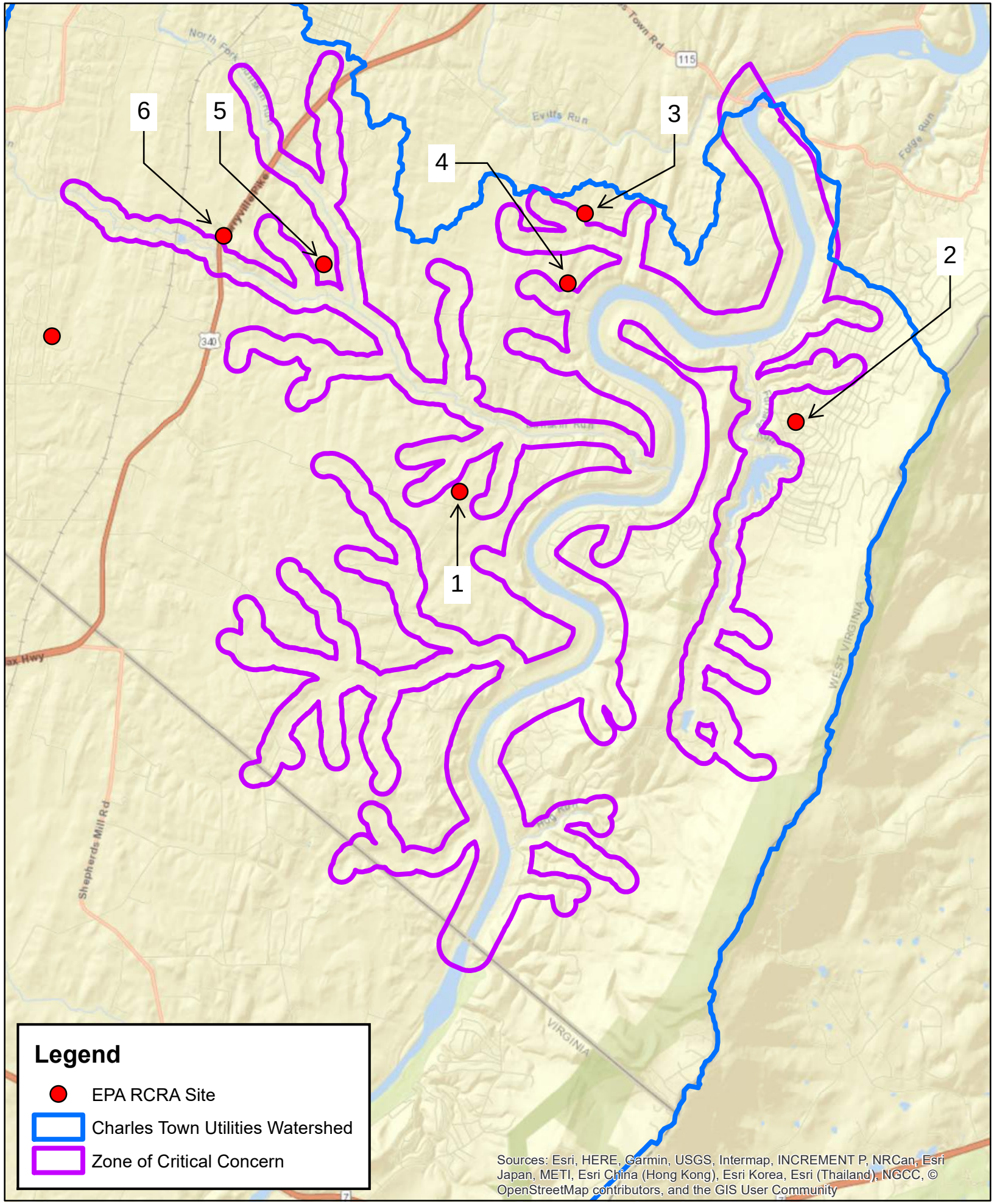
Legend
Agricultural
Commercial
Municipal
Residential
Charles Town Utilities Watershed
Zone of Critical Concern
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community
Dewberry
0 0.25 0.5 1 Miles
N W E S
DATE
April 2024
TITLE
Unregulated Potential Sources of Contamination
WV3301905 - Jefferson County



Dewberry

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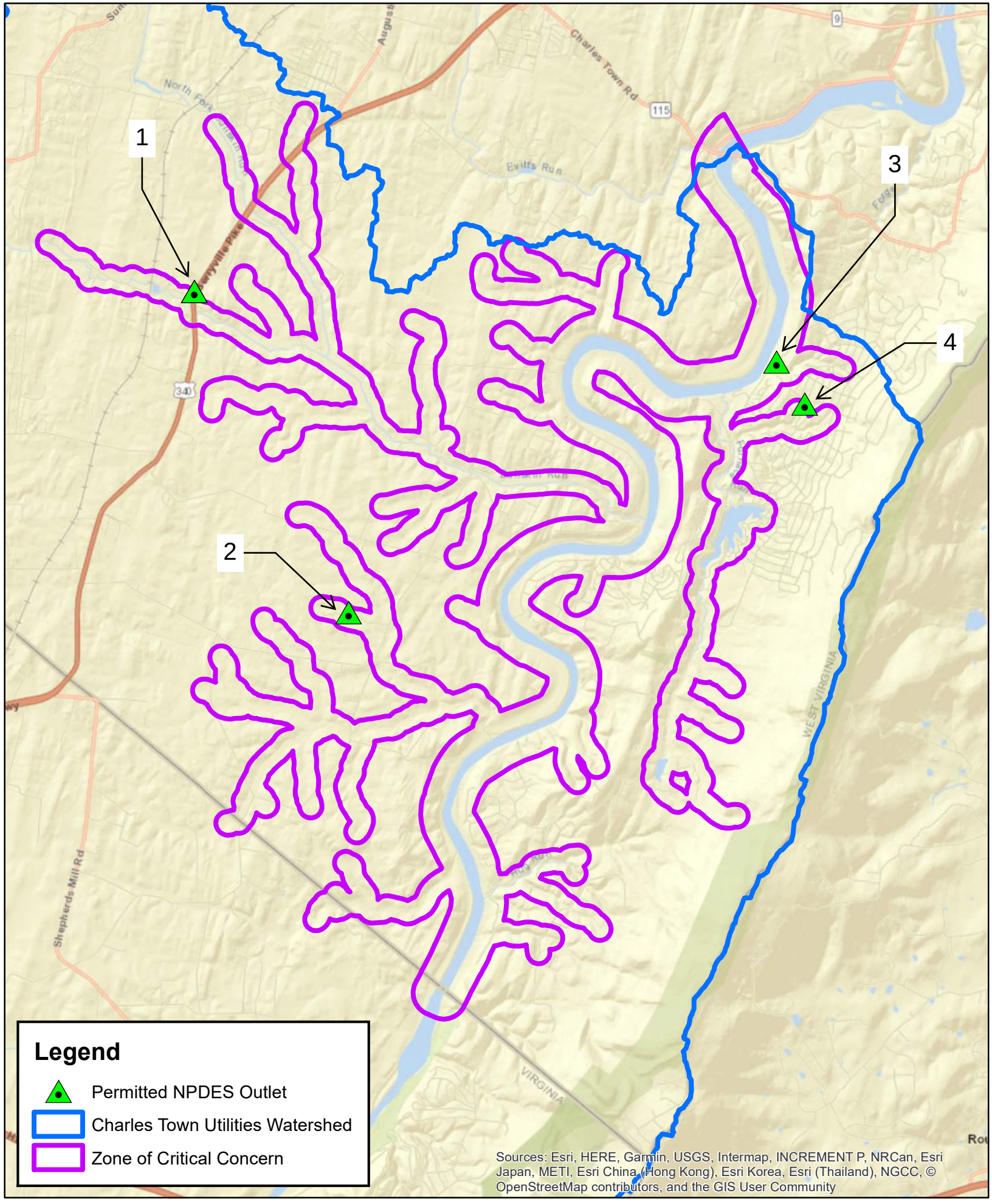
N W E S

DATE	TITLE
April 2024	*EPA RCRA Sites*

WV3301905 - Jefferson County



Dewberry

DATE: *April 2024*

TITLE: *Permitted NPDES Outlet*

WV3301905 - Jefferson County

PSSC Lists

Charles Town Utility Board
Source Water Protection Plan
Local & Regional PSSC List - April 2024

PSSC Number	Site Name	Site Description	Source Category	Associated Chemicals	Threat to GW	Threat to SW
1	Pasture	Animal Feedlots	Agriculture	NN MP TO	H	H
2	Crop Fields & Feed Lot	Animal Feedlots	Agriculture	NN MP TO	H	H
3	Crop Fields & Feed Lot	Crops, corn soybeans, wheat	Agriculture	NN MP TO	H	H
4	Cattle Pasture & Small Feed Lot w/Barn	Animal Feedlots	Agriculture	NN MP TO	H	H
5	Soybean Field	Animal Feedlots	Agriculture	NN MP TO	H	H
6	Corn Field	Crops, corn soybeans, wheat	Agriculture	NN SOC MP	L	L
7	Dave's Auto Repair & RV Sales	Car dealership	Commercial	PH VOC	H	L
8	Avon Bend Farm	Drainage Canals	Agriculture	T	L	L
9	Silos and Storage Area on Private Property	Pesticide, fertilizer, petroleum and trans.	Agriculture	PN NN SOC VOC	L	L
10	Oakwood Farm Dairy and Taylor Mountain Farm	Pasture	Agriculture	MP SOC	L	L
11	Water Intake Supply	Other	Municipal	Null	Null	Null
12	Lakeshore Grille and Restaurant	Other	Commercial	Null	Null	Null
13	Old Lake Lodge at Shannondale - Closed	Other	Commercial	Null	Null	Null
14	Old Lake Lodge at Shannondale - Closed	Other	Commercial	Null	Null	Null
15	Old Lake Lodge at Shannondale - Closed	Other	Commercial	Null	Null	Null
16	Wheatland Horse Farm	Pasture	Agriculture	MP SOC	L	L
17	Railroad tracks crossing stream	Railroad tracks and Yards	Commercial	PH M VOC HM SOC	H	H
18	Shannondale Springs Wildlife Management Area	Marina/boat docks	Commercial	PH	L	H
19	Grammy's Place Daycare - closed	Other	Commercial	Null	Null	Null
20	Railroad tracks crossing Bullskin Run near Wheatland	Railroad tracks and Yards	Commercial	PH M VOC SOC	Null	Null
21	Trailer Community	Residential (single family homes)	Residential	VOC SOC NN	H	H
22	House	Septic Systems (leach field)	Residential	MP VOC SOC TO NN	H	H
23	House	Residential (single family homes)	Residential	VOC SOC NN	H	H
24	PCS #12	Crops, corn soybeans, wheat	Agriculture	NN SOC MP	H	H
25	Private Home at 1043 Lakeside Drive	Wells: abandoned	Municipal	VOC SOC MP PH NN	H	L

Charles Town Utility Board
Source Water Protection Plan

EPA RCRA Site PSSC List - April 2024

PSSC Number	Primary Name	Location	City	FIPS Code	HUC Code	Create Date	Update Date
1	Rhodrick Property UST Removal	3178 Kabletown Road	Charles Town	54037	2070007	11/27/2019	NULL
2	John Satterwhite	2 Red Oak Road	Harpers Ferry	54037	2070007	11/27/2019	NULL
3	Mark Cooke Residence	8 Runny Meade Road	Charles Town	54037	2070007	11/27/2019	NULL
4	NU Look Cleaner No. 19	Hillendale Shopping Center	Charles Town	54037	2070007	11/27/2019	NULL
5	Mark Stolipher	1599 Roper North Fork Road	Charles Town	54037	2070007	11/27/2019	NULL
6	W.A. Chester	3607 Berryville Pike	Charles Town	54037	2070007	11/27/2019	NULL

Charles Town Utility Board
Source Water Protection Plan

EPA NPDES Outfalls PSSC List - April 2024

PSSC Number	Permit Number	Facility Name	Description	TC Description	Permit Type	IUT Description	RP Name
1	1003-06-037	Rainbow Diner/Truck Stop	Septic Systems	Renewed	UIC Sewage	Injection Point	340 Rainbow LLC
2	WVSG10026	Snyder Environmental Holdings LLC	Sludge/Septic Land Disposal	Renewed	Sewage	Land/Farm/Field	Snyder Environmental Services, Inc.
3	WVG870001	Black Fly/Gypsy Moth Programs	Pesticide	Renewed	Industrial	Outlet	WV Dept. of Agriculture
4	WVG416832	Pristine Homes LLC	Home Aeration Unit	New	Sewage	Outlet	Pristine Homes LLC

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 for a groundwater source.

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

Form C - 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 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.

Appendix B - Form B

Proposed Ground Monitoring Worksheet

Describe the type of early warning detection equipment that could be installed, including design:
Since the previous document's publication, CTUB has installed a HACH source water panel. This panel provides real-time monitoring for temperature, pH, dissolved oxygen, conductivity, oRP, turbidity and includes an "oil in water" sensor which is capable of notifying staff if petroleum products are detected in the raw water. This panel along with our SCADA system provides operators with up to the minute alerting for contamination events that could occur in the source water.
Where would the equipment be located?:
The source water panel has been installed and in use since May of 2020 and is located in the upper level of the source water intake structure.
What would the maintenance plan for the monitoring equipment entail?:
The source water panel is under contract with the manufacturer (HACH) to perform all maintenance and calibration.
Describe the proposed sampling plan at the monitoring site:
All parameters analyzed for in the source water panel are logged to our existing SCADA network. Alarms are set to notify the operator on duty of any changes to the source water which may indicate a potential contamination event.
Describe the proposed procedures for data management and analysis:
Data taken from the source water panel is logged in our existing SCADA system. This allows us to note trends in the source water, this allows us to plan for and respond to events outside of "normal" trends that can be expected due to excess rainfall and seasonal changes.

APPENDIX C. COMMUNICATION PLAN TEMPLATE

Charles Town Utilities PWSID: **WV3301905**

Authorizing Signature: **Kristen Stolipher**

Contact Phone Number: **(304) 724-7080**

Contact Email Address: **kstolipher@ctubwv.com**

Plan Developed On: **April 2024**

ACKNOWLEDGMENTS:

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

INTRODUCTION

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

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

TIERS REPORTING SYSTEM

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

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

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

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

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

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

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

Tier	Tier Category	Risk Level	Tier Summary
A	Announcement	Low	The water system is issuing an announcement to the public and public agencies about an incident or event that could pose a threat to public health and safety. Additional information will be provided as it becomes available.
B	Boil Water Advisory	Moderate	Water system users are advised to boil any water to be used for drinking or cooking, due topossible microbial contamination. The system operator will notify users when the boil water advisory islifted.
C	Cannot Drink	High	System users should not drink or cook with the water until further notice. The water can still be used for showering, bathing, cleaning, and other tasks.
D	Do Not Use	Very High	The water should only be used for flushing commodes and fire protection until further notice. More information on this notice will be provided as soon as it is available.
E	Emergency	Extremely High	The water should not be used for any purpose until further notice. More information on this notice will be provided as soon as it is available.

COMMUNICATION TEAM

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

Water system communication team members, organizations, and roles.

Team Member Name	Organization	Phone	Email
Kristen Stolipher	Charles Town Utilities	(304)724-7080	kstolipher@ctubwv.com
John Nissel	Charles Town Utilities	(304)725-2311	jnissel@charlestownwv.us

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

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

COMMUNICATION TEAM DUTIES

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

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

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

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

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

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

INCIDENT / EVENT COMMUNICATION PROCEDURE

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

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

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

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

As the flow chart indicates, several iterative cycles will occur after the initial threat assessment, including communication with local agencies and the public, further investigation of the incident, possible implementation of

the water system's contingency plan, and eventual elimination of the threat and a return to normal operations. Communication activities during this period will include:

- The initial release (i.e., Announcement, Boil Water Advisory, Cannot Drink, Do Not Use, or Emergency)
  - Sent to local health agencies, the public, and the news media within 30 minutes.
- Notification of the local water system's source water protection and communication teams
  - If warranted by initial findings regarding the spill, release, or incident.
- Notification of the WV Bureau of Public Health
  - As required
- Periodic information updates, as incident response information is received.
- Updates to the applicable A-B-C-D-E advisory tier, as necessary

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

EMERGENCY SHORT FORMS

Emergency Communication Information

	Name	Phone	Email
Designated spokesperson:	Kristen Stolipher	(304)724-7080	kstolipher@ctubwv.com
Alternate spokesperson:	John Nissel	(304)725-2311	jnissel@charlestownwv.us
Designated location to disseminate information to media:	Charles Town Utility Board 661 South George Street, Suite 101 Charles Town, WV 25414		
Method of Contact:	Word of Mouth Posted Notices Door-to-door canvasing Radio advertisements. newspaper Auto Dialer		

Media Contacts:	Name	Title	Phone Number	Email
	Bill Kohler, The Herald Mail	Editor	(301)733-5131	billk@herald-mail.com
	The Journal		(304)263-8931	
	Spirit of Jefferson	Publisher	(304)725-2046	editor@spiritofjefferson.com
	WKMZ Radio		(304)263-6586	info@talkradiornr.com
	WEPM 1340		(304)263-8868	
	WYII		(304)263-0637	
	WHAG Channel 25		(301)797-4400	

Emergency Service Contacts

	Name	Emergency Phone	Alternative Phone	Email
Police	WV State Police	(911)___-_____	(304)725-9779	
Fire	Citizens Fire Company	(911)___-_____	(304)725-2814	
Ambulance	Jefferson County Ambulance Authority	(911)___-_____	(304)728-3287	
Hazmat	Stephen Allen, Director JCOHSEM	(911)___-_____	(304)728-3290	sallen@jeffersoncountywv.org
Other	Jefferson County Sheriff, Tom Hansen	(911)___-_____	(304)728-3205	thansen@jcsdwv. com
Other	Charles Town Police Department, Chief Chris Kutcher	(911)___-_____	(304)725-2714	ckutcher@charlestownwv.us.com

Sensitive Populations

Other Communities that are served by the Utility:	Hospital, Nursing Homes, City of Ranson, Jefferson County Schools, and Charles Town Races			
Major User/Sensitive Population Notification	Name	Emergency Phone	Alternative Phone	Email
	Jefferson Memorial Hospital		(304)728-1600	
	Blue Ridge Care & Rehabilitation Center/Willowtree Manor		(304)725-6575	
	Genesis healthcare/Shenandoah Health Village Center		(304)724-1101	
	City of Ranson		(304)724-1101	
	Wright Denny School, Charles Town Middle (Jefferson County Schools) Brandon Caton		(304)725-5711	
	Charles Town Races Donald Godfrey		(304)886-9749	
EED District Office Contact	Name	Phone	Email	
	Justin Jordan	(304)725-9453	Justin.e.jordan@wv.gov	
OEHS Readiness Coordinator	Lee Orr	(304)356-4290		

Downstream Water System Contacts	Water System	Contact Name	Emergency	Alternate Phone	Email
	City of Brunswick, MD	Patrick Hoffmaster		(301)834-7671	
	City of Fredrick, MD	Ben Arneson (Superintendent of Water Maintenance)		(301)600-1681	susans@cityoffrederick.com
	Sandy Hook Water System	Kim Bowers		(240)313-2600	
	Petersville, MD			(301)834-7500	
Are you planning on implementing the TIER Communications plan?:			Yes		

Emergency Service Key Staff Members

Key Staff Responsible for Coordinating Emergency Response Procedures:	Name	Title	Phone	Email
	Kristen Stolipher	Utility Manager	(304)724-7080	kstolipher@ctubwv.com
	Chris Hutzler	Chief Operator	(304)725-3761	chutzler@ctubwv.com
Staff Responsible for Keeping Confidential PSSC Information and Releasing to Emergency Responders.	Kristen Stolipher	Utility Manager	(304)724-7080	kstolipher@ctubwv.com

Emergency Response Information

List Laboratories available to perform sample analysis in case of emergency.	Name	Phone
	HydroChem Laboratories	(304)725-6174
	Pace Analytical	(877)859-7778
Has utility developed a detailed Emergency Response Plan in accordance with the Public Health Security Bioterrorism preparedness and Response Plan Act of 2002 that covers the following areas?: YES		X
When was the emergency response plan developed or last updated?: 2021		X

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 - Lee Orr

Phone: 304-356-4290

Cell: 304-550-5607

E-mail: Lee.E.Orr@wv.gov

Environmental Engineering Division Staff

Charleston, Central Office (304) 558-2981

Beckley, District 1 (304) 256-6666

St. Albans, District 2 (304) 722-0611

Kearneysville, District 4 (304) 725-9453

Wheeling, District 5 (304) 238-1145

Fairmont, District 6 (304) 368-2530

National Response Center - Chemical, Oil, & Chemical/Biological Terrorism

1-800-424-8802

WV State Fire Marshal's Office

1-800-233-3473

West Virginia State Police

1-304-746-2100

WV Watch – Report Suspicious Activity

1-866-989-2824

DEP Distance Calculator

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

PRESS RELEASE ATTACHMENTS

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

UTILITY ISSUED NOTICE – LEVEL A

PUBLIC WATER SYSTEM ANNOUNCEMENT

A WATER SYSTEM INVESTIGATION IS UNDERWAY

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

The incident involves the following situation at this location:

_____

_____

_____

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

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

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

State Water System ID# _____ Date Distributed: _____

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

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

□ Entire Water System or □ Other: _____
_____

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

What should I do?

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

What happened?

- **The problem is related to** _____

What is being done?

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

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

- _____

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

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

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

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

UTILITY ISSUED NOTICE – LEVEL C

"CANNOT DRINK" WATER NOTIFICATION

A LEVEL C WATER ADVISORY IS IN EFFECT

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

□ Entire Water System or □ Other: _____

_____

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

What should I do?

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

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 _____.

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

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

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

UTILITY ISSUED NOTICE – LEVEL D

"DO NOT USE" WATER NOTIFICATION

A LEVEL D WATER ADVISORY IS IN EFFECT

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

□ Entire Water System or □ Other: _____

_____

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

What should I do?

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

What happened?

- **The problem is related to** _____

What is being done?

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

  _____

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

- _____

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

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

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

UTILITY ISSUED NOTICE – LEVEL E

EMERGENCY WATER NOTIFICATION

A LEVEL E WATER ADVISORY IS IN EFFECT

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

□ Entire Water System or □ Other: _____

_____

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

What should I do?

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

What happened?

- **The problem is related to** _____

What is being done?

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

  _____

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

- _____

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

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

This notice was distributed by _____

State Water System ID# _____ Date Distributed: _____

APPENDIX D. SINGLE SOURCE FEASIBILITY

Water Source Alternative:

Did not complete the alternative source study	
Name of Alternative:	Installed 1,000,000 gallon finished water tank.
Brief Description of the Alternative:	Installed 1,000,000 gallon finished water tank.
Feasible?:	No
Provide Cost Estimate:	$0
Would this alternative supply 100% of your needs?:	No
Economic Criteria - Operation and Maintenance Costs:	0
Economic Criteria - Capital Cost:	0
Technical Criteria - Permitting:	0
Technical Criteria - Flexibility:	0
Technical Criteria - Resilience:	0
Technical Criteria - Institutional Requirements:	0
Environmental Criteria - Environmental Impacts:	0
Environmental Criteria - Aesthetic Impacts:	0
Environmental Criteria - Stakeholder Issues:	0
Final Score:	0.00%

Section 4
WATER TREATMENT PLANT IMPROVEMENTS

A. General

This chapter contains a detailed list of recommended improvements that should be made to the Charles Town Water Treatment Plant. The effective capacity of the plant was reviewed and the current regulatory environment was summarized with respect to the potential impact on treatment requirements. The chapter also presents options for increasing the treatment capacity and includes a review of alternative treatment processes.

B. Capacity Assessment

The average plant production is 1.7 MGD. This number has been fairly consistent over the past few years, even as the population has increased. This is attributed to the lower percent lost water number. The City still strives to reduce the lost water percentage and plan to implement projects such as lead service lateral replacements, meter upgrades, main replacements, etc., over the next few years.

Due to the current Ranson and Charles Town population growth percentages, GD&F recommends assuming that the water plant production will increase by about 15% in the next 10 years, and subsequent ten-year periods. At this projection, the following average daily demands will be anticipated over the next 30 years. In 2032 the estimated average daily demand would be 1.955 MGD, in 2042 it would be 2.24 MGD and in 2052 it would be 2.58 MGD. It is also recommended to implement a plant peak factor of 1.42. This would then yield the plant design value for each year. Based on this peak factor, the following plant maximum flow rates over the next ten years can be computed as follows: 2.78 MGD in 2032, 3.18 MGD in 2042 and 3.66 MGD in 2052.

According to the WV Department of Health, they would prefer that water treatment facilities operate for no more than 16 hours per day. This gives the operators at least one (1) eight-hour shift to address any major issues or make repairs while the plant is offline. Thus, the treatment facility should be designed to produce 2.58 MG in sixteen (16) hours. This equates to a plant flow rate of 3.87 MGD. Since this value is larger than the 3.66 MGD calculated using the peaking factor, the higher of the two (2) numbers should be used. GD&F recommends utilizing 3.8 MGD, which is 1.0 MGD greater than the current WTP. This should be the design flow rate of the new water treatment facility.

C. Treatment & Regulatory Goals

1. Status of Regulations

The United States Environmental Protection Agency (USEPA) is in a continuous process of modifying and expanding drinking water regulations under the 1986 Safe Drinking Water Act (SDWA) and its subsequent amendments. Rules that are now in effect provide two levels of criteria that comprise the primary and secondary drinking water standards. Primary Drinking Water Standards are based on health-related criteria that require mandatory enforcement by state primacy agencies (West Virginia Department of Health and Human Resources). Secondary Drinking Water Standards are based on criteria that are intended to control water aesthetics (i.e. color, taste, odor) and do not pose a health

risk at levels realized in nearly any type of source water. Unlike primary standards, parameters developed as secondary standards are established as guidelines to be enforced at the discretion of the state primacy agency, but are not required in order for the agency to maintain primacy. Although parameters governed by secondary standards are not health-based, they can have a significant effect on customer satisfaction. Secondary standards include parameters such as color, taste and odor, iron, and manganese.

Two (2) primary drinking water regulations especially critical for both current compliance and for planning at the CTWTP in the near future include:

- Surface Water Treatment Rule (SWTR) and Enhanced Surface Water Treatment Rules (ESWTR), which provide for protection against microbial pathogens with specific criteria for *Cryptosporidium*, Giardia, viruses and Legionella.

- Disinfection Byproducts Rules, which regulate disinfectant residuals and disinfection byproducts that are formed by reactions of various disinfecting agents with constituents in water.

The ESWTR consists of the Interim Enhanced Surface Water Treatment Rule (IESWTR), the Long-Term 1 Enhanced Surface Water Treatment Rule (limited applicability to the Charles Town system) and the Long-Term 2 Enhanced Surface Water Treatment Rule. The IESWTR regulations require filtered water turbidity < 0.3 NTU in at least 95 percent of samples taken each month, with established action limits for turbidity excursions over shorter periods of time. In addition to these turbidity criteria, the West Virginia Bureau of Public Health encourages utilities to meet goals established by the Partnership for Safe Water, a cooperative effort between the USEPA and the American Water Works Association (AWWA). These criteria have established a more stringent, voluntary turbidity goal of less than 0.1 NTU in at least 95 percent of samples.

The third part of the ESWTR regulations are the Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). This regulation requires varying levels of treatment depending on the potential risk of *Cryptosporidium* in a source water. Under the LT2ESWTR, the amount of *Cryptosporidium* risk is classified into "bin categories" that are determined based on the extent to which sampling shows *Cryptosporidium* to be present in raw water. Based on early sampling of larger water systems, many utilities find they do not have significant levels of *Cryptosporidium* in the raw water, placing most utilities in a Bin 1 classification. Plants that fall into a Bin 1 classification are not required to add any additional treatment beyond meeting the turbidity limits set forth in the IESWTR.

The City's recent testing resulted in a Bin 1 classification; however, the raw water source will continue to be subjected to future testing.

The disinfection byproduct regulations consist of the Stage 1 Disinfectant/Disinfection Byproduct Rule (D/DBPR) and the Stage 2 D/DBPR. The Stage 1 DBPR includes requirements for total organic carbon (TOC) removal as well as for control of disinfection byproduct formation in the system. TOC removal requirements are based on the TOC concentration and the alkalinity in the raw water. The Shenandoah River in the area of

the City's intake typically has alkalinity levels of greater than 120 mg/L and TOC levels ranging from 2 to 4 mg/L. At these raw water conditions, 15 percent TOC removal is required to comply with the Stage 1 D/DBPR. The City routinely complies with this TOC removal percentage. However, additional TOC removal is currently required such that the chloramination process can be eliminated.

The Stage 1 D/DBR also set disinfection byproduct limits of 80 µg/L and 60 µg/L, respectively, for total trihalomethanes (TTHMs) and haloacetic acids (HAA5s) on a system-wide average basis over four (4) consecutive quarters. Stage 2 of the Disinfectants/Disinfection Byproducts Rule has strengthened the regulation to require compliance with these levels on a four-quarter running average basis at a variety of sampling locations within the distribution system.

The EPA uses the Unregulated Contaminant Monitoring Rules (UCMRs) to collect data for suspected contaminants in drinking water that do not currently have health safety standards. The EPA is currently up to their 5th round of such testing/monitoring. Most of these focus on various organic contaminants such as endocrine disrupters, pharmaceuticals and personal care products. These are possible candidates for future regulations.

2. Treatment Goals

Gwin, Dobson & Foreman, Inc., has developed treatment goals to form the basis for evaluation of potential treatment process sequences. A list of goals is provided in Table 4. These goals were dictated by the aforementioned regulations and provide a set of criteria that must be reached to avoid non-compliance as well as exceed the minimum removal required to satisfy the regulatory requirements of some key water quality parameters. These higher goals were set to either assure customer acceptance from an aesthetic standpoint or to provide greater comfort and assurance with respect to public health.

Table 4: Charles Town Potable Water Quality Goals

Parameter	**Goal**
Settled Turbidity	<1.0 NTU
Finished Turbidity	<0.10 NTU
Giardia/Cryptosporidium	Multiple Effective Barriers – 4-log removal
LRAA TTHM (Median 4-qtr LRAA)	≤60 µg/L
LRAA HAA5 (Median 4-qtr LRAA)	≤45 µg/L
TOC Removal % (12-month median)	15-25% Pretreatment [25-75% with GAC]
Iron	<0.10 mg/L
Manganese	<0.02 mg/L
Color	≤5 pcu
Lead (90th Percentile)	0.005 mg/L
Copper (90th Percentile)	0.4 mg/L
Distribution Microbials	Limit Regrowth
System Corrosion/Discoloration	Minimize

D. Discussion of Treatment Facility Needs

The existing treatment facility does not consistently meet the settled turbidity or finished water turbidity treatment goals. The process wastewater recycle process is the leading factor to this problem. The settled TOC values are just barley being met, additional TOC removal is necessary to eliminate chloramination and effectively reduce the disinfection byproducts.

Another treatment goal where there is concern between the treatment goal and the CTWTP is the barriers for Giardia and *Cryptosporidium*. The design and operation of the existing sedimentation basins and media filters create a situation where they may not be serving as consistent barriers to Giardia and *Cryptosporidium*. A discussion of these problems occurs in the following parts of this section.

1. Raw Water Intake

As mentioned previously, the CTWTP currently draws water from the Shenandoah River. The intake structure is located approximately six (6) inches above the river bottom. At this location, the historical minimum depth of the river is approximately five (5) feet. The raw water intake system consists of raw water screens and a conveyance pipe leading to the pump station.

Raw Water Screens

The incoming water is screened through a single stainless steel tee and then conveyed through approximately 560 feet of 20-inch diameter ductile iron pipe which crosses the river bottom to reach the raw water pumping station. The intake structure has a reported capacity of 4.7 MGD. At this flow, the velocity through the screen is 0.52 ft/sec.

Flow velocities through intake screens are typically designed to be less than 0.5 ft/sec to minimize the impact to aquatic life and also to ensure a uniform flow pattern through the screen. If the flow were to increase significantly above 0.5 ft/sec its operation would be more difficult and impact to the aquatic life may be noticed.

Solids that accumulate on the submerged intake screen due to the suction are removed using an air burst system. This system delivers strong pulses of high pressure air across the screen to remove debris. Operators have reported that, at times, the air burst system performs poorly, especially at times of high turbidity. During turbidity events, the air burst system must be used very frequently (approximately every 5 minutes) to ensure the intake does not become clogged.

The intake has experienced a significant problem with the accumulation of frazil ice (similar characteristics to a "slushee") on the screen. This accumulation is caused by super-cooled water that freezes in the quiescent water, using the screen as a base. This problem can be addressed by a new fully functioning and redundant airburst system that could periodically be used in cold weather to prevent the formation of the frazil ice.

Currently, there are no regulations/limitations regarding the volume or rate of water the City can pull from the Shenandoah River. Flow in the river is more than adequate to meet the increasing water demands of the service area. The lowest flow on record in the Shenandoah at the Millville gauging station was 126 MGD, measured on July 24, 1930 (Chester Engineers, 2001). However, as noted above, the intake and screen structure will need to be expanded at the same time as the treatment plant to provide adequate capacity.

Screen and Airburst System

A second redundant tee screen, supply line and concrete debris deflector are recommended such that there is adequate supply of raw water to the treatment plant.

The existing intake structure and pump station were designed and built with cut-outs for relatively easy placement of a second intake pipe. Adding a second 20" intake pipe at the time of plant expansion will ensure that flow velocities within the pipe and within the intake screens remain below engineering limitations and will provide redundancy. Also, the existing 20” wet well supply line knife gate valve should be replaced due to its current age and condition.

A new automatic air burst screen cleaning system should also be installed for each of the two (2) screens with new stainless steel air supply lines. A level sensor should also be added to the wet well and everything should be tied into the plant SCADA system. The airburst system can then automatically airburst the screens in the event of a low wet well level.

A new upstream tee screen concrete diversion structure should be installed out in the river to protect the integrity of the screens and consist of a grated top to keep the leaves and other debris from clogging the screens. This would require a permit through the Army Corps of Engineers. Refer to Appendix A for an example of a new concrete debris deflector with secondary screen.

2. Raw Water Pumping

Water is conveyed from the intake to the raw water pumping station on the west bank of the river. The pumping station consists of two (2) 125 horsepower pumps, with a combined capacity of approximately 6 MGD. As a result, the firm capacity of the pumping station, with one pump out of service, is approximately 3 MGD. Raw water from the pumping station is pumped through a 7,400 foot, 16-inch DIP to the treatment plant. The pumps have been rebuilt several times and are currently scheduled to be rebuilt this year. The pump motors may be original and should be replaced as part of the upgrade project.

Pump Station

Based on projected demand increases, the firm capacity of the raw water pumps will meet the potable water demands for the foreseeable future.

Conveyance Pipe

Calculations of headloss and velocity were done to assess the capacity of the existing 16-inch DIP. It was concluded that the 16-inch diameter raw water conveyance pipe is more than adequate to meet the future demands of the system.

3. Rapid Mix

The existing inline static mixer is 16“ diameter and was replaced several years ago. A new inline static mixer should be considered in the upgrade project sized for the maximum plant capacity.

4. Flocculation & Sedimentation

a. Flocculation

Following rapid mix, flow is split into two (2) dual stage flocculation basins. The detention time in the flocculation basins at peak production capacity is 30 minutes. The basins contain vertical paddle wheel mixers with variable speed drives. Currently, the performance of the flocculation basins is satisfactory.

The flocculation basins were constructed in 2016 and are in relatively good physical condition. However, increasing the capacity of the plant would ultimately require an increase in volume of the flocculation basins to meet treatment goals. Consideration should be given to keep the existing treatment plant in operation while constructing new flocculation basins.

b. Sedimentation Basins

Flocculated water flows to two (2) parallel sedimentation basins. Both basins are fitted with inclined plate settlers. The detention time in the basins at peak capacity is approximately two (2) hours.

Both sedimentation basins were constructed in 2016 and are in good physical condition. When the settled solids are adequately removed, the sedimentations basins can produce settled water with turbidities less than 1 NTU. However, there are often significant basin performance issues when solids accumulation at the bottom of the sedimentation basins is excessive. As such, solids removal is critical to the overall performance of the facility, and, as plant data has shown, inadequate solids removal in the sedimentation basin results in floc carry over to the filters and potential turbidity breakthrough. Another issue is the overall size of the existing sludge thickener tank. This tank is currently undersized and is the limiting factor in the operators being able to adequately remove sludge from the basins.

The current sludge processing process is not working very effectively. Solids have to be constantly and consistently hauled offsite for further processing.

The existing sedimentation basins also lack proper detention time. It is recommended that a minimum of four (4) hours of detention time for proper solids settling be implemented. Also, the incline plate settlers appear to work fine; however, they are difficult to clean. The current sludge vacuum system has had its share of problems. Currently, there is no way to drain the flocculation tanks or sedimentation basins. The basins are currently full of bio-growth.

Consideration should be given to new sedimentation basins with at least four (4) hours of contact time between the existing and new basins combined. The new basins should be equipped with fiberglass chain and scrappers and a sludge hopper area. Automated drain valves and flow meters should be installed to displace the accumulated sludge from the basins. FRP weirs and troughs should be installed along with a new effluent channel and level sensor. See attached Appendix B for typical flocculation and sedimentation basin drawings.

5. Filtration

After sedimentation, the water is passed through one of four (4) multi-media filters. The filters operate in a declining rate mode of filtration; the water level in all four filters is the same and more water simply passes through the cleanest filter. As a result, under this mode of operation, the filters do not have individual flow control. The filter boxes are designed to allow the common water surface level to fluctuate as overall (or average) headloss through the filters varies. The water level rises as the filters become dirty and the overall headloss increases and reaches a point where the dirtiest filter must be backwashed to reduce headloss. Low headloss levels must also be managed to reduce the potential for an excessive filtration rate. Filter backwash water is currently recycled back to the headworks of the plant. It is recommended to replace the conventional filters with a new low pressure microfiltration membrane system. Refer to the Alternatives Evaluation section of the report for more information.

6. Clearwell

A legacy baffled clearwell of 36,000 gallons is still used immediately after the filters. Filtered water is pumped to a new 1.0 MG clearwell which provides storage of treated water prior to distribution via the finished water pumps. The clearwell also provides disinfection contact time to meet the associated regulatory requirements. The WTP clearwell is a circular concrete structure with a submersible mixer. The associated tank baffling factor is 0.10, thus the effective clearwell volume is 100,000 gallons. Between the old and new clearwell, the minimum 0.50 log inactivation is easily achieved. The old clearwell should be abandoned as part of the plant upgrade. The newer 1.0 MG clearwell will provide sufficient chlorine contact time to meet the anticipated future demands. The existing legacy clearwell should be abandoned. To facilitate better baffling, the submersible mixer should be removed in the new 1.0 MG clearwell and an interior tank baffle wall should be added between the tank inlet and outlet pipes. A mixer can promote short-circuiting and lead to a reduced baffling condition.

7. Finished Water Pumping

Following the clearwell, finished water is pumped and metered to the distribution system. The finished water pumping system consists of two (2) 150 HP, manually-controlled, horizontal centrifugal pumps rated 1,945 GPM at a TDH of 229 feet. The pumps were installed in a new Pump Building in 2016. Pump operation is based on maintaining a desired water level in the Route 9 storage tank.

The pumping system has met the needs of CTWTP; however, the firm capacity of this pumping system is 2.8 MGD. As water demands increase, this capacity will be insufficient and these pumps and their associated electrical items will need upgraded.

8. Chemical Feed Systems

Refer to previous Section 3 for additional information.

9. Residuals Handling and Disposal

Residuals handling primarily involves removing solids from the sedimentation basins which are conveyed to a sludge thickener tank. The decant water is recycled back to the head of the plant. The solids are currently being disposed of offsite to either the existing Charles Town Wastewater Treatment Facility or to another sewer plant for processing. Hauling and disposal costs vary based on the amount of solids produced.

In terms of alternative residual handling alternatives, there is no public sewer connection available at the treatment plant to convey plant solids and residuals to a wastewater treatment facility. The current CTUB sewer system; however, is within one (1) mile of the water treatment plant. Construction of a sewer line from the WTP property to the existing CTUB sewer is a viable option for solids disposal. Alternatively, CTWTP could pursue a NPDES permit and return all liquid waste to the Shenandoah River. However, the NPDES option would require the construction of concrete bottom lagoons for solids drying and over a mile of gravity piping. These dried solids would also then need to be periodically disposed of.

Currently, filter waste water is recycled to the head of the plant, which typically degrades the quality of the plant influent and provides the potential for particulates and pathogens removed by the filters to be recycled back to the head of the plant.

10. General Facility Issues

The CTWTP was constructed in 1990, and, as such, it has been in operation over thirty years. While the physical condition has been maintained, many of the original plant components are in need of modernization and upgrade to accommodate increased production requirements and enhanced water quality goals.

a. Condition of treatment structures and buildings

There are no known or obvious structural issues at the plant site. The buildings and treatment structures appear to be in fair condition. The basement and pipe gallery are congested, wet and make it difficult to perform maintenance.

b. Space (office, lab, locker, meeting, restroom, etc.)

There has been no physical expansion of the CTWTP since its construction in 1990. The office, lab, locker room and restrooms provide adequate space to meet the current needs of the staff and visitors to the plant.

The laboratory at the treatment plant appears to have adequate space, but some analytical equipment and other labware should be upgraded and additional equipment may be required in the future.

c. Code Issues

There are some current issues with the Chlorine Gas that are discussed in Section 3 of the report.

d. HVAC Issues

There are no known heating, ventilation, air conditioning (HVAC) issues associated with the existing facilities. However, in conjunction with plant expansion, plant support systems such as HVAC and plumbing should also be modified and improved as required to support the expanded plant.

e. Electrical and Instrumentation & Control (I&C), Standby Power

There are no known significant issues with the electrical and instrumentation and controls systems at the plant. Backup power is provided for both the intake and WTP via standby emergency generators.

f. Security

The overall security at the CTWTP could be improved. Currently, there are no entry checkpoints, alarm systems or identification system at the plant. These relatively simple improvements could significantly increase the security of the plant and decrease the chances of theft, vandalism or contamination at the plant.

The treatment plant site is completely surrounded by a chain link fence. Consideration for a closed circuit television system should be considered as part of the plant upgrade.

g. Maintenance, Shop, Parts Storage

The CTWTP was designed and constructed with auxiliary space for maintenance and shop activities as well as for parts storage. These spaces are in reasonable condition and have adequately served the needs of the treatment plant operators. Similar to the office and lab spaces, the need for additional parts, shop and maintenance space will increase as plant production increases.

E. Recommendations

Based on the evaluation of the existing facilities, the following recommendations were developed. The intent of the recommendations is to ensure that the City of Charles Town continues to meet treatment goals at the projected future flow rate of 3.8 MGD. Capability to meet future flow rates can best be accomplished by construction of a new treatment facility.

1. Recommendations for Capacity Increase

Construct a new, 3.8 MGD, water treatment facility that consists of backup sources, raw water intake system upgrades, new inline static mixer, flocculation and sedimentation basins modifications and expansions, membrane and GAC filtration and UV and sodium hypochlorite disinfection. Also, construction of a new pump station to convey process waste to the existing CTUB system. The new treatment plant should be designed with room for modular expansion.

a. Additional Raw Water Sources

- Either develop a pump station for Cattail Spring or develop a well on Todd Wydmyer's property. Extend power to well and a waterline to the existing WTP.
- Develop a well near the intersection of S. George Street and S. Samuel Street. Extend power to the well and a waterline to the existing WTP.

b. Raw Water Intake System

- Install a parallel 20" intake pipe leading from the river to the raw water pumping station along with a new stainless steel air line. Add a second T-screen and replace the existing 20" knife gate valve.
- Install a cast-in-place concrete diversion structure in the river upstream of the two (2) screens. Place a secondary stainless steel grating structure on top of the diversion structure to further protect screens and to prevent leaves and debris from entering screen openings. Leave downstream end of concrete diversion structure open.
- Add an automatic airburst screen cleaning system inside the pump station that features a control panel, fast acting pneumatic valves, dual air compressors and air receiver tank. The panel should be programmed to automatically utilize compressed air to clean each screen.

- Add a new ultrasonic level transmitter to the intake wet well.
- Add a new telemetry system for communication between the intake system and water treatment plant.
- Provide new 125 HP inverter duty rated motors for each vertical turbine intake pump. Note that pumps will provide 2.8 MGD each and should be sufficient for several years. Once their capacity is reached, the pumps, VFDs, electrical and generator will need to be upgraded.

c. New Treatment Facility Construction

Raw Water Piping

- Connect to the existing raw water line and bring a new raw water line into the new treatment facility. Provide a new raw water turbidimeter, magnetic flow meter and inline static mixer on the line. Also provide sample taps, chemical injections, and air release valves.

Flocculation and Sedimentation Basins

- Construct a new concrete dual stage flocculation basin where each of the two (2) basins yields 30 minutes of contact time when added to the existing flocculation basins at the plant design flow rate of 3.8 MGD. Provide new variable speed floc mixers and mud valves on each floc drain with associated drain piping.
- Continue utilizing PACl for coagulation. Provide a new bulk chemical feed system inside the Chemical Room of the new plant.
- Provide two (2) new sedimentation basins each sized such that there is a four (4) minimum detention time at plant design flow rate of 3.8 MGD, when using the existing and new basins.
- Provide two (2) new chain and scraper sludge collectors.
- Provide new effluent fiberglass weirs and troughs.
- Provide new submerged pressure transducer in sedimentation basin effluent channel for level.
- Provide a common influent and effluent channel. Design a perforated wall to allow flow to enter basin evenly. Provide an underflow wall to keep solids below water surface. Slope bottom of sedimentation basins toward sludge hoppers.
- Slide gates are also required for flow isolation.
- The new structure will be above grade so aluminum stairs, grating and handrail will be required.
- Provide new precast concrete meter and valve vault for automated sludge valves and magnetic flow meters.

Membrane Filtration

- Construct new, low-pressure membrane filtration system with a capacity of 3.8 MGD, which allows for future expansion. A new Control Building would be necessary and the recommended building type is concrete floor slab type with masonry walls, precast concrete roof structure with EPDM roofing material. Membrane system to consist of the necessary feed tanks and pumps, prestrainers, membrane module racks, backwash tanks and pumps, compressed air system, automated chemical clean-in-place (CIP) system with neutralization and water softening system. The CIP system should be housed in a separate room with the other treatment plant chemical feed stations.
- Membrane system should utilize 0.10 micron PVDF modules type as manufactured via the Thermally Induced Phase Separation (TIPS) process. Design flux rate would be around 40 gallons per day per square foot of membrane area (GFD). One (1) membrane system skid would be fully redundant.
- Demolish the existing media filters.

GAC Filtration

- Construct new, low-pressure granular activated carbon (GAC) filtration system with a capacity of 2.8-3.0 MGD and expandable to 3.8 MGD for TOC removal.
- A total of six (6) 40,000 pound GAC vessels should be installed with consideration to add two (2) future tanks. The tanks should be designed in lead-lag formation such that the total membrane filtrate flow will be divided by three (3). Flow will go through the lead GAC vessel and then the lag vessel for TOC removal. Typical design flow rate is 6-10 gpm/ft^2 with contact times between 7-10 minutes per vessel.
- Automated valves and magnetic flow meters should be provided on each set of vessels for flow control.

UV Disinfection

- Two (2) fully redundant UV systems should be considered as a multiple barrier type treatment system. The UV system is a cheap alternative that does not utilize any chemicals or create any byproducts. UV disinfection assists in the inactivation of viruses and *Cryptosporidium*.

Chemical Feed Systems

- The new treatment facility should feature a separate chemical feed room housing all treatment chemicals. A bulk coagulant and sodium hypochlorite chemical feed system is recommended. All new feed systems should consist of duplex peristaltic chemical feed pumps with

calibration columns, valves, day tanks, digital scales, containment, etc. Caustic soda, acid, fluoride, corrosion inhibitor and a spare chemical feed station should be considered.

Disinfection

- The new 1.0 MG clearwell is currently adequate for CT. To increase baffling, consider eliminating the submersible mixer and installing an interior baffle wall.
- Discontinue use of chlorine gas and utilize sodium hypochlorite for free chlorine.
- Eliminate chloramination as it is no longer required due to functioning GAC system.

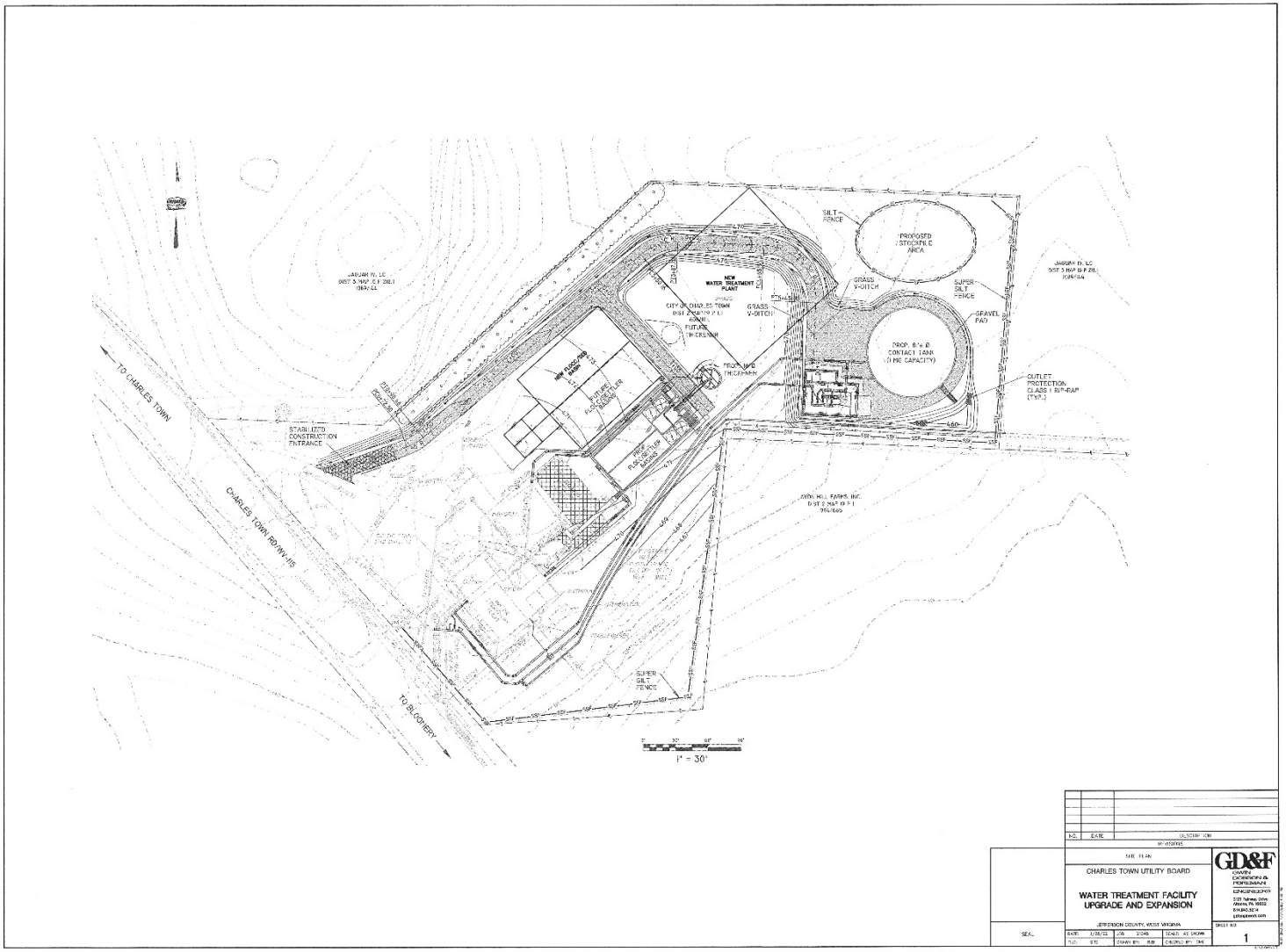
Solids Handling

- Construct a new pump station that conveys the water treatment plant process solids either to a new NPDES discharge location or ties into the existing CTUB sewer system. Note that two (2) concrete bottom lagoons and piping to the Shenandoah River would be necessary if the NPDES option is selected. Dried sludge would then need disposed of offsite. A slow and steady low-flow solids discharge rate into the existing CTUB sewer system is the preferred option.
- Discontinue all process wastewater recycling.

2. Piloting

Prior to design and construction of a new membrane and GAC filtration process, a minimum three (3) month piloting process must be done to establish and confirm design criteria and satisfactory process performance as well as help the City procure the most cost-effective membrane and GAC system for its specific water. Typical membrane pilot studies involve side-by-side testing of several different manufacturers. This enables a thorough examination of the process and selection of the most appropriate membrane system and GAC media for this application. The first step of the piloting process is for the engineer to prepare a Pilot Study Protocol and submit to the WV Health Department for approval.

Figure 7: Proposed Site Plan Layout for New WTP



APPENDIX E. SUPPORTING DOCUMENTATION