

**State of West Virginia
Source Water Assessment and
Protection Program
Source Water Assessment Report**

**Shepherdstown Water
Braxton County
PWSID: WV3301933**



Prepared by:

**West Virginia Department of Health and Human Resources
Bureau for Public Health
Office of Environmental Health Services
Source Water Protection Unit**

Date: November 2003

**Surface Water Public Water Supply Systems
Source Water Assessment and Protection Program (SWAPP)
Susceptibility Report**

Prepared by the West Virginia
Bureau for Public Health,
Source Water Assessment and
Protection Unit

Date Prepared: Tuesday,
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What is the Purpose of a Susceptibility Report?

A susceptibility report identifies the most significant potential contaminant sources that could threaten the quality of your public water supply. Your susceptibility ranking does not imply poor water quality. Regular water tests best reflect actual water quality. This report will be used by public water supply systems with a surface water source. In addition, this report will enhance West Virginia's existing watershed approach to water quality improvement and protection. Table 1 provides you information on your public water supply.

What is SWAPP?

The SWAPP, established under the Safe Drinking Water Act, requires every state to:

- inventory land uses within the recharge areas of all public water supplies;
- assess the susceptibility of drinking water sources to contamination from these land uses; and
- publicize the results to provide support for improved protection of sources.

Table 1: Public Water Supply (PWS) Information

PWS Name	Corporation of Shepherdstown
PWS Address	P.O. Box 248 Shepherdstown, WV 25443
PWS ID Number	WV3301933
County	Jefferson
System Type	Community

The West Virginia Bureau for Public Health (BPH) is undertaking this task. The rankings of susceptibility of your intake (s) to potential contamination are listed in Table 2.

Table 2: Intake Information

Facility Name	Source Name	Design Meets Regulations	Susceptibility Ranking
Corporation of Shepherdstown Water Treatment Plant	Potomac River	Yes	High

R.D. Zande & Associates, Inc. in conjunction with the WV BPH Central Office assessed the source, Corporation of Shepherdstown. A file review and field survey were used to conduct the assessment. The field reconnaissance survey for the Shepherdstown area began on October 28, 2002. Personnel interviews were also conducted on November 6, 2002 within the Shepherdstown area. Interviews with personnel from the Shepherdstown water treatment plant indicated that both the raw water and the potable drinking water meet the requirements of the federal and state governments' guidelines. Copies of the Corporation of Shepherdstown last Annual Drinking Water Quality Report, which is commonly referred to as the Consumer Confidence Report, is provided in the back of this report. During the assessment, there were a few inaccessible areas within the Shepherdstown area that were a result of the lack of accessible roadways. There were also areas that were inaccessible due to their location on private property.

What is my Source Water Protection Area (SWPA)?

Unlike ground water aquifers, which have a natural protective layer above them, 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. Because of this, the SWPA consists of two types of delineations.

- **Watershed Delineation Area**

The first type of delineation is the Watershed Delineation Area (WSDA). Figure 1 shows the extent of the WSDA, which covers approximately 3,798,797 acres in the Potomac River Direct Drains Watershed. The WSDA includes the entire watershed area upstream of the intake, and includes waters from the State of West Virginia, Maryland, Virginia and Pennsylvania. The perimeter of the catchment area provides the water to the water supply intake. The WSDA for the Shepherdstown area consisted mainly of agricultural land uses, pasture fields, and crop fields, mainly corn. Limited areas of industrial or commercial land uses were also found.

- **Zone of Critical Concern**

The second type of delineation is the Zone of Critical Concern (ZCC). Figure 2 shows the ZCC area, which covers approximately 1,438 acres. The ZCC is a corridor along streams within the WSDA area that warrants a more detailed inventory and management due to its proximity to the surface intake and to the susceptibility to potential contaminants. The ZCC is calculated 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. The ZCC width is 1000 feet from each bank of the principal stream and 500 feet from each bank of the tributaries draining into the principal stream. The development around the ZCC consisted mainly of agricultural areas, pasture fields and crops, and small areas of residential communities. Shepherdstown College, located completely within the Corporation Limits, was located within approximately 1,000 feet of the water treatment plant's intake.

What is Susceptibility?

Susceptibility is a measure of your intake's potential for contamination from land uses and activities within the SWPA at concentrations that pose a concern. The purpose of the susceptibility analysis is to provide a pointer to what action a public water system should take to further define and reduce susceptibility. This may include recommendations for a more detailed inventory and assessment, monitoring work, or an indication of the type and intensity of source water and other protection activities needed.

The possibility of a release from potential contaminant sources is greatly reduced if best management practices (BMP's) are used. However, the susceptibility determination for your intake did not take into account whether BMP's are being used.

Susceptibility of a drinking water intake does not mean a customer will drink contaminated water. Water Suppliers protect drinking water by monitoring and treating water supplies, and using BMP's and source water protection measures to ensure that safe water is delivered to the tap.

How Was The Water Supply Susceptibility Determined?

Your intake (s) susceptibility is based on the following:

Resource Characterization

The purpose for conducting the Resource Characterization analysis of the delineated SWPA is to obtain an understanding of its physical, biological, chemical, and hydrological characteristics. Four resource characteristics were evaluated:

- The potential for surface runoff to occur;
- The ease that surface runoff transport material can be delivered into the stream;
- The movement through the SWAP area; and
- The biological and chemical health of the surface water resource in the SWAP area.

- **Potential for Surface Runoff to Occur**

The soil types present in the watershed area and the associated soil properties have a direct influence on the potential for

surface runoff to occur. As infiltration rate of soil increases, (more precipitation soaking in rather than running off) the contaminant load associated with the reduced runoff should decrease. Table 3 provides a summary of the associated soil groups.

Table 3: Summary of Soil Associations in the WSDA

Soil Associations	Soil Drainage	Topographic Setting
HgC-Hagerstown & Frederick	Moderate to well drained	Steep to nearly level
DgB-Duffield loam	Well to poorly drained	Gently sloping
Am-Alluvial land	Moderate	Gently sloping
HiC3-Hagerstown & Frederick	Moderate	Steep to nearly level
Ho-Huntington local alluvium	Moderate	Gently sloping
HbB-Hagerstown loam	Moderate to well drained	Steep
HgD-Hagerstown & Frederick	Well drained	Very steep
FcD3-Frankstown loam	Well drained	Very steep
FbD-Frankstown loam	Well drained	Very steep
DgC-Duffield loam	Moderate	Very steep
FcD-Frankstown loam	Moderate to well drained	Steep to nearly level
FcC-Frankstown loam	Moderate	Gently sloping

- **Ease of movement of material into the Stream System (Rate of Overland Material Transport):**

The size, shape, and slope of the SWAP area have a direct influence on material transported by surface runoff. In general, the longer the overland travel distance and travel time that surface runoff has taken in order to reach a stream channel, the greater the chance it has to deposit and filtrate the contaminants that may occur. Table 4 provides an analysis of the size, shape, and slope of Shepherdstown's WSDA.

Table 4: Hydrologic Setting

Size of WSDA Area (mi ²)	5,242
Shape of WSDA Area	Large & Irregular
Stream Length (Main Stem) (mi)	104
Average Watershed Slope	10 to 30 %

- **Movement of Water through the Watershed Area** Table 5: Movement of Water

A number of physical and natural factors can influence the movement of water through the SWAP area. The pattern and development of the drainage network of the SWAP area directly influence the rate of water movement. Evaluation of the hydrologic cycle will provide an indication of the amount of annual rainfall that is absorbed into the ground or becomes runoff. Table 5 summarizes the total mileage of streams contained in the WSDA, average stream gradients of the main stem, average rainfall, the nearest relevant USGS stream gauge, distance to gauge, topographic position of gauge, annual mean discharge, high flow, and low flow.

Number of Stream Miles	4,032
Average Stream Gradient (Main Stem)	3.11 ft/mi
Average Rainfall	37
Nearest Relevant USGS Stream Gauge	01618000
Distance to Relevant USGS Stream Gauge (mi)	< 1
USGS Stream Gauge Topographic Position	Downstream
Annual Mean Discharge (cfs)	NA
High Flow (cfs)	335,000 (1936)
Low Flow (cfs)	170 (1966)

- **Review of Water Quality Data**

In order to characterize the condition of the surface water within the watershed, the available chemical and biological water quality data was reviewed. This data was collected as part of the BPH and the West Virginia Department of Environmental Protection (DEP) implementation of the federal Safe Drinking Water Act and Clean Water Act. Water quality data was evaluated to help provide direct pointers to a source of contamination and to direct the focus for additional source evaluations. Additionally, immediate source water protection efforts will be identified by this review.

Available water quality data includes test results from treated drinking water, finished water, and untreated source water (raw water) conducted by the water supplier; ambient water chemistry; biological criteria and monitoring (bacteria, macroinvertebrates and fish); and habitat evaluation. The sampling requirements for public water systems vary depending on the type of system and the federal regulated testing requirements. Therefore, a lack of water quality impacts may indicate the lack of a certain type of sampling rather than a lack of contamination.

Summary of Raw and Finished Water Quality Results from Public Water System

Water sampling conducted for the Corporation of Shepherdstown's water treatment plant indicates that raw water turbidity maximums appear to have a remarkably low turbidity level detection. The Shepherdstown water treatment plant routinely monitors for contaminants commonly found in drinking water according to federal and state governing agencies. In addition, the Corporation of Shepherdstown's water treatment plant monitors over 35 other contaminants, none of which were detected.

On no occasions have the observed concentrations been above the established MCLs for the parameters set for the finished water guidelines. For additional information on the finished water quality, please review the consumer confidence report for a yearly summary of the water quality.

Summary of Chemical and Biological Water Quality Results from the West Virginia DEP

In 2000, the DEP conducted biological and chemical water quality monitoring on 41 streams totaling 276.36 miles in the Potomac River Direct Drains Watershed for the 305b report, as a requirement of the federal Clean Water Act. One hundred and twenty four miles (44.9%) were fully supporting their overall designated uses. Considering major and moderate/minor impacts, the principal causes of impairment in the watershed are siltation (39.10 miles), and fecal coliform (24.36 miles). Considering both major and moderate/minor impacts, the principal sources of pollution in the watershed are agriculture (43.85 miles), unknown source (33.18 miles), and urban runoff/storm sewers (30.72 miles). During this reporting cycle, 175.28 stream miles in the Potomac River Direct Drains Watershed were monitored for toxics. Of these, 1.50 miles (0.9%) had elevated levels. During this reporting cycle (1997-1999), no streams in the watershed were assessed for Fish Consumption use. A fish-consumption advisory currently is in effect for the Potomac River mainstem from Piedmont to the Cacapon River confluence (38 miles). The advisory covers non-sport fish only. No streams in the Potomac River Direct Drains watershed are currently on the 303(d) list. (NOTE: Although the Potomac River mainstem currently is under a fish consumption advisory, since the stream belongs to the State of Maryland, it is not included on West Virginia's 303(d) list.

Summary of Other Available Chemical and Biological Water Quality Data

Not Available.

POTENTIAL SIGNIFICANT CONTAMINANT SOURCES (PSCS'S):

Inventory of Potential Significant Contaminant Sources

The purpose of providing an inventory of certain types of land uses, potential significant contaminant sources, and activities within the SWAP area is to aid in reducing the risk posed to the public drinking water supply. The following subsections provide information regarding the methodology used to generate the inventories.

The inventory portion of the SWAP consists of two steps:

- The first step is the broad inventory based primarily on regulated and existing databases. The inventory consists of a general land use analysis, the identification of regulated activities in the delineated WSDA areas, and an analysis of road and rail crossings adjacent to the streams in the WSDA area.

- The second step is the detailed inventory of PSCS's in the ZCC. The detailed source inventory is conducted to identify PSCS's that were not captured in the broad regulated source inventory and to field verify the PSCS's in the ZCC. PCS's located during the inventory are found on Figure 2.

A detailed risk-assessment of the PSCS's was beyond the scope of this survey because of minimal data and resources. Local decision makers should do the detailed risk analysis because they are better suited to make the bridge from assessment work to protective strategies. The West Virginia SWAP program can provide guidance to the decision makers and help in prioritizing the PSCS sources.

• Existing (primarily regulated) Database Review

Table 6: Summary of existing (primarily regulated) PSCS's

Table 6 is a summary of existing PSCS's based on public information obtained from various federal, state, and local agencies that maintain environmental regulatory databases. These databases provide information about the regulatory status of a property and incidents involving use, storage, spilling or transportation of oil, and hazardous materials.

	NUMBER	PERCENT
WSDA	1139	100
ZCC	3	0.3

Table 7: Summary of PSCS within the ZCC

• Summary of the Detailed Inventory

Table 7 is a summary of the detailed inventory of potential contaminant sources in the ZCC. The detailed source inventory was conducted to identify PSCS's that were not identified in the existing database review and to verify the location of the PSCS within the ZCC. Additional potential significant contaminant sources that were identified in detailed inventories of the ZCC consist of commercial activities (golf course and marina/boat docks) and a municipal operation.

Potential Contaminant Source	TOTAL PSCS'S	PERCENT
AGRICULTURE	0	0
RESIDENTIAL	0	0
MUNICIPAL	1	33
COMMERCIAL	2	67
INDUSTRIAL	0	0

• Transportation Network

A summary of the transportation network is shown in Table 8. This information can be used to aid in planning for transportation related accidents that could result in contamination of the source water in the delineated WSDA. Table 9 is a summary of the transportation network stream crossings in the WSDA within the WV state boundary. Please note that miles of train tracks could also be less due to decommissioning of tracks.

Table 8: Transportation Network Summary for WSDA within WV

	Within 100 feet of stream	Total
Miles of Interstate	0.04	26
Miles of Primary	8	519
Miles of Secondary	0.67	35
Miles of Train Tracks	17	315

Table 9: Transportation Network Stream Crossings in the WSDA within WV

	Train Tracks	Interstate	Primary Roads	Secondary Roads
Number of Stream Crossings	195	9	173	16

- **General Land Use**

The general land use analysis will provide an indication of which land uses predominate throughout the SWAP area, near the intake, or adjacent to the rivers, streams, lakes, and reservoirs. The land use in the SWAP area (limited to WV state boundary) is shown in Table 10.

Table 10: General Land Use in WV Portion of SWAP Area

LAND USE	WSDA Area (Acres)	WSDA % of Total	ZCC Area (Acres)	ZCC % of Total
Major Highway	399	0.02	NA	NA
Shrubland	16,492	0.9	NA	NA
Woodland	5,886	0.3	NA	NA
Surface Water	28,359	1.6	404	40.6
Major Powerline	6,201	0.4	2	0.2
Populated Area	3,484	0.2	4	0.4
Light Intensity Urban	19,335	1.1	24	2.4
Moderate Intensity Urban	2,931	0.2	6	0.6
Intensive Urban	1,580	0.1	NA	NA
Row Crop Agriculture	37,115	2.1	28	2.8
Pasture/Grassland	404,857	22.9	201	20.2
Barren Land – Mining/Construction	3,362	0.2	4	0.4
Floodplain Forest	16,530	0.9	118	11.9
Diverse/Mesophytic Hardwood Forest	416,546	23.6	2	0.2
Oak Dominant Forest	593,605	33.6	202	20.3
Conifer Plantation	10,109	0.6	NA	NA
Wetland	5,022	0.3	NA	NA
Other Forest	192,366	10.9	NA	NA

SWAPP Area Assessment and Protection Activities

Analysis of the Resource Characterization and potential significant contaminant sources of the SWAP area for the Corporation of Shepherdstown indicates that the water supply is susceptible to possible future contamination based on the following:

- ✓ The large, irregular size of the WSDA presents an increased potential for contamination. In addition, the large number of stream crossings (393 total) provides the opportunity for an accidental release/spill of material to easily get directly into the stream drainage network. Source water protection efforts should be directed toward the establishment of an effective and efficient emergency response plan if one does not currently exist.
- ✓ Current land use practices appear to be having an adverse impact on the ecological health of the Potomac River Direct Drains Watershed. This is evidenced by the 276.36 miles assessed in the DEP 303b report; only 44.9% were fully supporting the overall designated use. The principal sources of pollution in the watershed are agriculture and urban runoff/storm sewers. Higher bacteria levels are generally concentrated around populations centers,

caused by regulated or unregulated discharges. In addition, the health of the Potomac may be impacted by a number of regulated and unregulated point and non-point sources in the ZCC and WSDA.

Recommendations:

- ✓ Protection efforts should focus on the collection of additional information on the point and non-point sources present to evaluate the risk;
- ✓ Work with the Department of Health and Human Resources, other state agencies and local officials to make sure your intake is included in local regulations and inspections efforts;
- ✓ Restrict access to the intake area and post the area with Drinking Water Protection Area signs;
- ✓ Address any biological contaminant issues; and
- ✓ Protection options need to be actively considered to further evaluate and manage all potential contaminant sources and the Corporation of Shepherdstown public water supply should place a high priority on protecting its supply source.

NEXT STEP – SWAP Protection Plan

The next step in source water protection planning is to prepare a SWAP protection plan. The SWAP protection plan incorporates this source water delineation assessment report and three additional sections: Contingency Planning, Alternative Sources, and Management Planning.

Contingency Planning

A contingency plan documents the system's planned response to interruption of the source water supply.

Alternative Sources

Information pertaining to alternative water sources focusing on long-term source replacement should the system be required to develop a new source of water due to contamination (or other reasons). This section outlines the most likely sources that can be used as an alternate water source.

Management Planning

Management planning is the most important element of SWAP. The management plan identifies specific activities that will be pursued by the system to protect their water resources. The system will benefit by taking a proactive approach to source water protection in their watersheds. It is anticipated that most of the management effort will focus on coordination with government agencies and periodic surveys of the watersheds. It may be necessary to conduct a limited number of special studies to determine actual risk and consequences for selected contaminant sources. This information may be needed before decisions can be made on management activities.

Need additional information?

Additional information or sources of information can be obtained by calling or visiting the BPH web site at www.wvdhhr.org/bph/swap or phoning 304-558-2981.

Disclaimer - The coverage's presented in this program are under constant revision as new sites or facilities are added. They may not contain all the potential or existing sites or facilities. The West Virginia Bureau for Public Health is not responsible for the use or interpretation of this information. Please report any inaccuracies on either the map or inventory by phoning 304-558-2981.

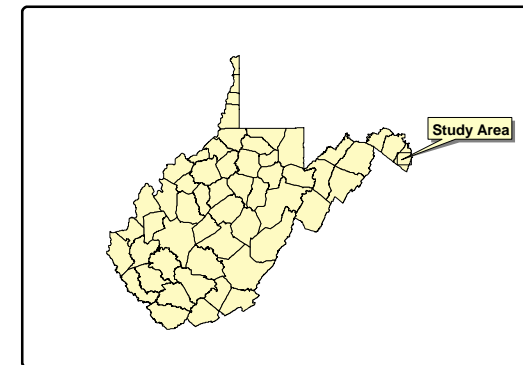
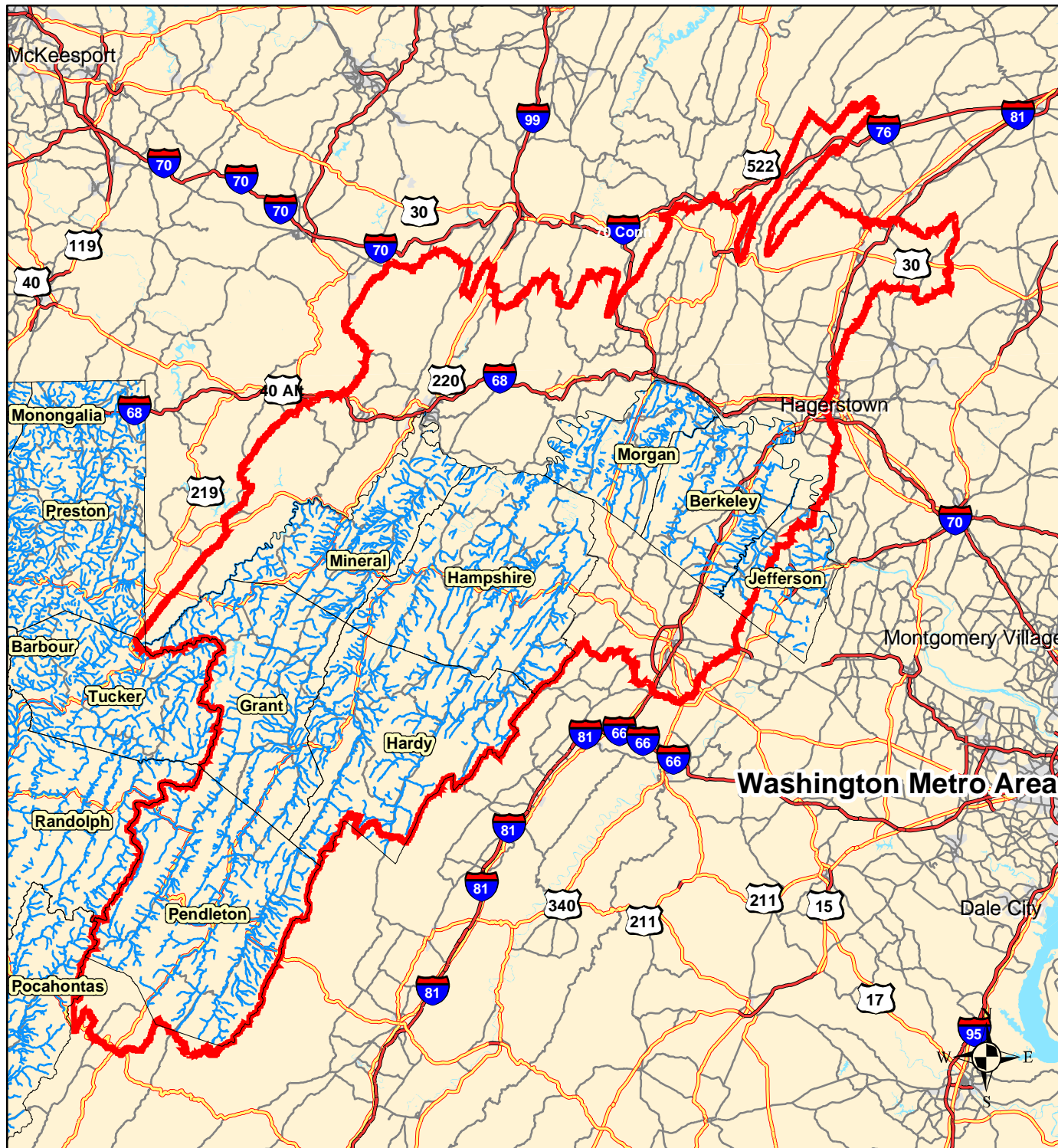
Glossary:

Best Management Practices (BMP's) are operational procedures used to prevent or reduce pollution.

Public Water System (PWS) is a system for the provision to the public of pipe water for human consumption, if such system has at least 15 service or regularly serves an average of at least 25 individuals daily at least 60 days of the year.

Water Quality Data is used to help assess both the potential pathogen contamination and other compliance monitoring (Nitrates) parameters associated with public water supply wells.

Potential Significant Contaminant Source (PSCS) is a facility or activity that stores, uses, or produces chemicals or elements, and has the potential to release contaminants identified in the state program within a source water protection area in an amount, which could contribute significantly to the contaminants of the source waters of the public water supply.



Map Key

Watershed Delineation Area



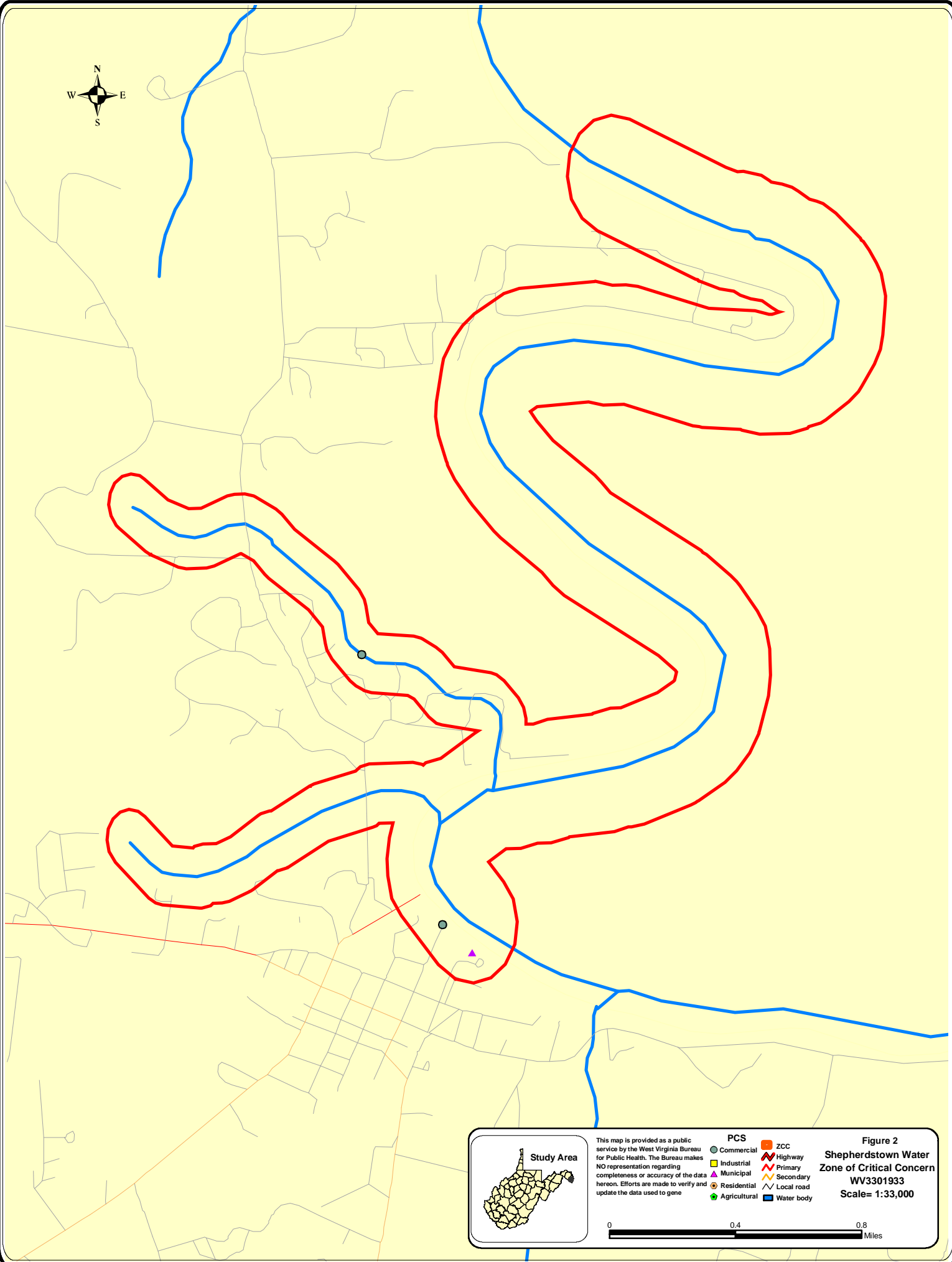
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Source locations not included for reasons of security

Shepherdstown Water Watershed Delineation Area WV3301933 Jefferson County

Scale: 1:1,260,000
Drawn by: ACS
03/19/04





Study Area

This map is provided as a public service by the West Virginia Bureau for Public Health. The Bureau makes NO representation or accuracy of the data hereon. Efforts are made to verify and update the data used to generate

- | | |
|----------------|--------------|
| PCS | ZCC |
| ● Commercial | ■ Highway |
| ■ Industrial | ■ Primary |
| ▲ Municipal | ■ Secondary |
| ● Residential | ▲ Local road |
| ● Agricultural | ■ Water body |

0 0.4 0.8 Miles

Figure 2
Shepherdstown Water
Zone of Critical Concern
WV3301933
Scale= 1:33,000