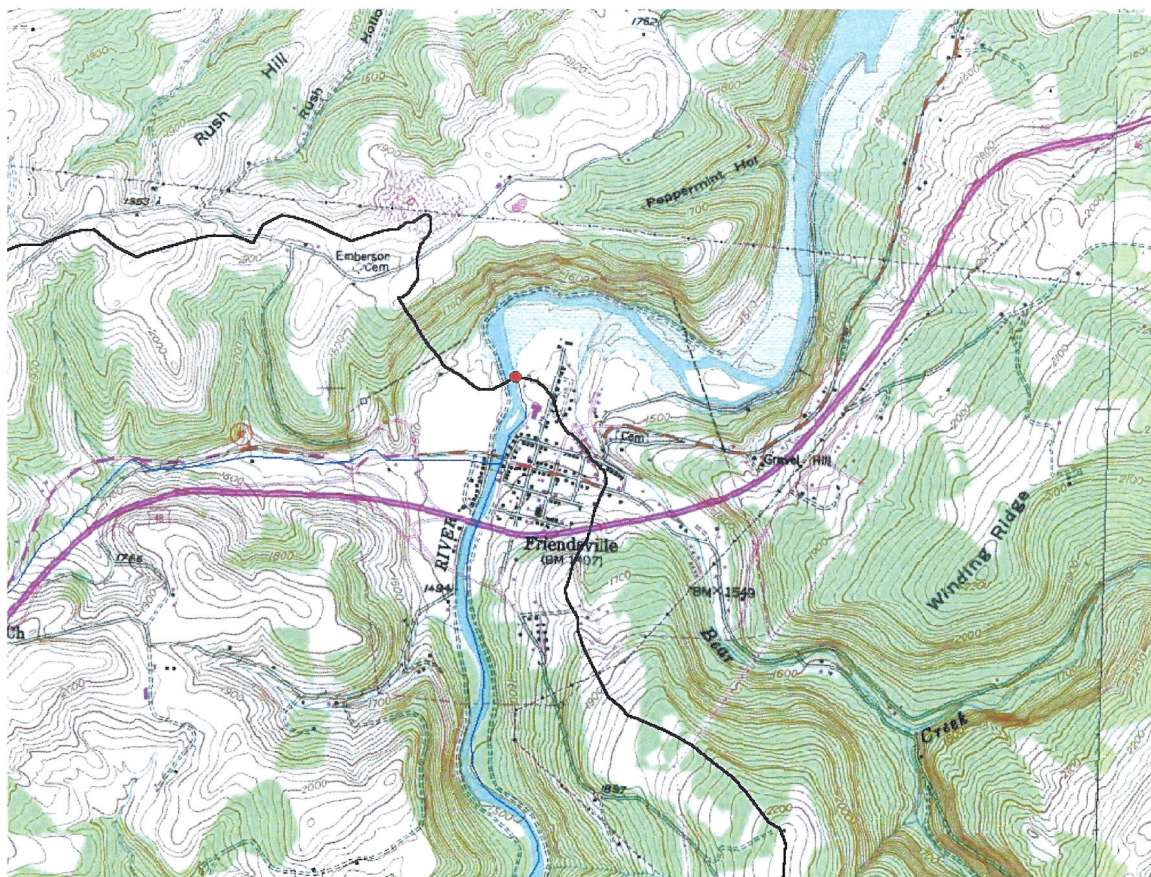


# SOURCE WATER ASSESSMENT

for the Town of Friendsville

Garrett County, Maryland



Prepared by  
Maryland Department of the Environment  
Water Management Administration  
Water Supply Program  
November 2004



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## EXECUTIVE SUMMARY

The required components of this report, as described in Maryland's Source Water Assessment Plan, are delineation of the area that contributes water at the source; identification of potential sources of contamination; determination of the susceptibility of the water supply to contamination; and recommendations for protecting the drinking water supply.

The Youghiogheny River is the main source of drinking water for the Town of Friendsville which provides drinking water to approximately 510 customers. The source water protection area (watershed) for Friendsville's Youghiogheny River intake is approximately 296 square miles (190,000 acres) of mostly forested and rural land located in Maryland and West Virginia within the Allegheny Plateau physiographic province. The watershed consists of mix land use, mostly agricultural (25%) and forested (68%). Several towns and small communities in Maryland and West Virginia are located in the watershed; the Towns of Oakland and Mountain Lake Park in Maryland and the Town of Terra Alta in West Virginia are the largest centers of population in the watershed above the Town of Friendsville's intake. Potential sources of contamination for Youghiogheny River watershed include point and non-point sources, including transportation (highways, railroads), on-site septic systems and runoff from agricultural lands and developed areas. There are seven municipal wastewater treatment plants and seven industrial discharges within the watershed.

The susceptibility analysis indicates that pathogenic bacteria, protozoa and viruses are the primary concerns for the Youghiogheny. Turbidity is also a contaminant of concern.

Several recommendations are included in Section I of this report. They include:

- forming a local watershed protection planning team,
- implementing a public awareness and outreach program,
- monitoring water quality for raw and finished water,
- working with the local soil conservation districts to implement best management practices for animal waste management, stream fencing and other riparian protection measures, and
- providing buffer and easements for sensitive areas of the watershed.



## **A. BACKGROUND**

The 1996 Safe Drinking Water Act Amendments require states to develop and implement source water assessment programs to evaluate the potential for contaminants to affect the sources of all public drinking water systems. A Source Water Assessment (SWA) follows a process for evaluating the susceptibility of a public drinking water supply to contamination. The assessment does not address the treatment processes or the storage and distribution of the water system, which are covered under separate provisions of the Safe Drinking Water Act. The Maryland Department of the Environment (MDE) is the lead state agency in this SWA effort.

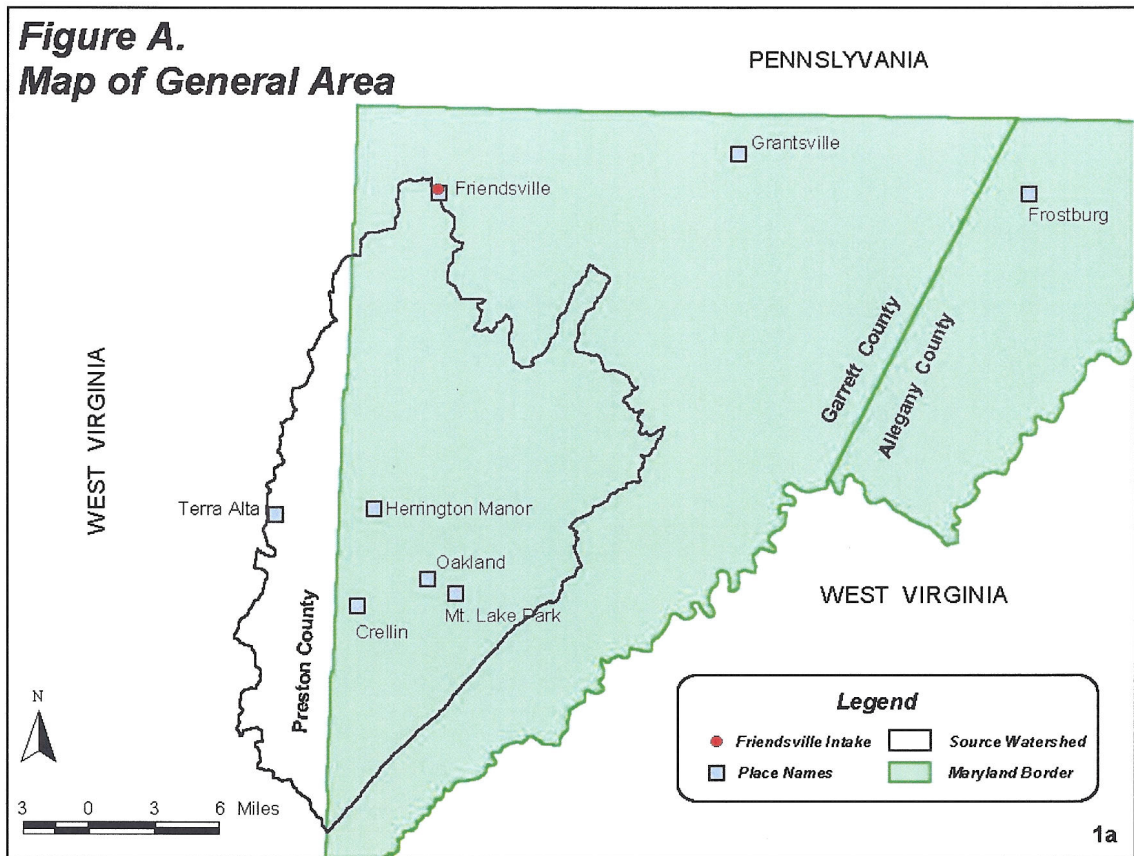
There are three main steps in the assessment process: (1) *delineating* the watershed drainage area that is likely to contribute to the drinking water supply, (2) *identifying* potential contaminants within that area and (3) *assessing* the vulnerability of the system to those contaminants. This document reflects all of the information gathered and analyzed required by those three steps. MDE looked at many factors to determine the susceptibility of this water supply to contamination, including the size and type of water system, available water quality data, the characteristics of the potential contaminants, and the capacity of the natural environment to attenuate any risk.

Maryland has more than 3,800 public drinking water systems. Approximately 50 of Maryland's public drinking water systems obtain their water from surface supplies, either from a reservoir or directly from a river. The remaining systems use ground water sources. Maryland's Source Water Assessment Plan was submitted to the Environmental Protection Agency (EPA) in February 1999, and received final acceptance by the EPA in November 1999. A copy of the plan can be obtained at MDE's website, [www.mde.state.md.us](http://www.mde.state.md.us), or by calling the Water Supply Program at 410-537-3714.

## **B. DEVELOPMENT AS A WATER SUPPLY**

The Town of Friendsville is located along the bank of the Youghiogheny River in the northwestern corner of Garrett County, Maryland. John Friend settled the area in 1765 when his family built several houses on an old Indian village. Garrett County is the westernmost county in the state, and Friendsville is the last incorporated town along Interstate 68 heading west towards West Virginia (see below). In 1974 the Town purchased the privately owned City Water Company, which had been supplying the Town with drinking water from the Youghiogheny River. The company had serious problems with water quality and would not have been able to supply the future water demand of the town. Plans had been underway in 1971 to develop completely new water treatment system (plant), and in 1976 the Town's new system, with a 0.1 million gallon a day (MGD) water plant, went online. This plant eventually deteriorated, and in 1991 Friendsville received a grant from the Maryland Department of the Environment (MDE) to correct defects in the plant's system and replace aging treatment components. In July 1996, the entire water system was turned over to the Garrett County Sanitary District (GCSD) for operation and maintenance (Garrett County Water & Sewer Plan – 1997).

The GSCD operates the rehabilitated plant each day from approximately 8:00am to 9:00pm. The plant has a design capacity of 0.2 MGD, and serves approximately 510 customers in the Friendsville area. Friendsville's water use is primarily domestic with minor commercial use. At the present time there is no industrial consumption. The plant employs conventional water treatment, which includes coagulation, static mixing, clarification, filtration, and disinfection by chlorine addition. The plant is equipped so that pre-disinfection can be applied if needed. (MDE – CPE Report, 1998).



### C. DESCRIPTION OF THE SURFACE WATER SOURCE

State of Maryland regulations classify the Youghiogheny River and all tributaries joining the main stem of the Youghiogheny River in Maryland as use III-P, upstream from the Maryland – Pennsylvania line (COMAR §26.08.02.08R). Use III-P streams are designated as rivers that can support natural trout waters and are also used for a public water supply. The Youghiogheny is designated as a State Scenic River (in 1971), and a portion of the river between Millers Run and the Friendsville town limit was designated in 1976 as Maryland's only Wild River (see Figure 5 in Appendix.). This stretch of river, which is protected by land use regulations, is upstream of the Friendsville intake. Land use regulations have been enacted to guide activities and preserve the wild characteristics of the river along this stretch. The Department of Natural Resources enforces these regulations, and also administers state property designated under Youghiogheny Scenic and Wild River lands (MD Section 305(b) Report – 2000). Garrett County also



recommends that the 22.2 miles of the Youghiogheny, from the Friendsville town limits to the Little Youghiogheny River (at the “88” bridge) be conserved essentially in its natural state (Garrett County Water & Sewer Plan – 1997). The Youghiogheny River is west of the eastern continental divide, so the river eventually empties into the Gulf of Mexico through the Ohio and Mississippi River systems. There is a dam on the Youghiogheny just over the Maryland line in Pennsylvania, creating the Youghiogheny River Lake. Friendsville’s intake is located just above the hydrologic zone where it becomes difficult to distinguish the river from the lake.

The plant intake is located in the middle of the river, and is just downstream of the town center and the Interstate 68 overpass. The Youghiogheny is approximately 45 yards wide at the intake and water plant, which is located along the eastern bank. There is a United States Geological Survey (USGS) stream gage located on the river approximately one mile upstream from the intake. This gage has been recording water flow and stage height of the Youghiogheny River continuously since 1940. The median annual flow at this gage is 406 cubic feet per second (CFS), and the highest recorded flow of 16,100 CFS occurred in January 1996. However since 1925, water flow at the gage, and the intake, has been affected by releases at the Deep Creek Dam. Below is a monthly summary of median flows for the data record 1940 – 1999:

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
MedianCFS	629	666	935	712	483	293	218	197	168	188	365	613	406

Major tributaries to the Youghiogheny include: Cherry Creek, Little Youghiogheny River, Herrington Run, and Deep Creek which are entirely within Maryland, and Snowy Creek, Laurel Run, Muddy Creek which flow through West Virginia and Maryland. There are several reservoirs, or lakes, within the Youghiogheny River watershed. Terra Alta Lake and Alpine Lake are in the Snowy Creek subwatershed in West Virginia. Reservoirs within Maryland include Herrington Run Lake, Broadford Lake near Oakland, and Deep Creek Lake, the largest body of freshwater in the state.

The source water protection area (watershed) for Friendsville’s Youghiogheny River intake is approximately 296 square miles (190,000 acres) of mostly forested and rural land in Maryland and West Virginia. The watershed is divided between the two states, with the majority of land, 228 square miles, within Maryland, and 68 square miles in West Virginia’s Preston County. The entire basin is located in the Allegheny Plateau physiographic province.

In the West Virginia portion of the watershed, Terra Alta, with a population of approximately 200 is the largest municipality and residential area. Other smaller communities include Corinth, Hopemont, Elgon, and Alpine Lake. In Maryland, Oakland is the Garrett County seat, but by 1990 nearby Mountain Lake Park became the largest town in the county. The adjacent towns of Oakland, Mountain Lake Park, and Loch Lyn Heights region, with a combined population of 5,000, is the residential, commercial, and industrial center of Garrett County (Garrett County Water & Sewer Plan – 1997). This area is located within the Little Youghiogheny River watershed. Other

towns within the intake watershed include most of Friendsville, the small communities of Crellin, Redhouse, Gortner, and Hutton, and the several communities that surround Deep Creek Lake.

Garrett County has a greater mean annual precipitation and a lower mean annual temperature than any other county in Maryland. The University of Maryland reports weather observations in Oakland (data from 1961-1990). Average annual temperature at Oakland is 47.7 ° F, with temperatures generally below freezing from December through February. Normal maximum temperatures in July is 79.8 ° F. The annual precipitation rate around Oakland is 46.77 inches, with the month of July the highest average, 5.12 inches. In Garrett County, heavy thunderstorms are common in the summer months, and snowfall can range from 45 inches per year in the east to 70 inches in the north-central part of the county during the winter. Average annual snowfall in this region is 83.9 inches.

#### **D. SOURCE WATER PROTECTION SITE VISIT**

Personnel from the Maryland Department of the Environment's Water Supply Program visited the Town of Friendsville's water system on June 24, 1999 to discuss the assessment of the Youghiogheny River, and to describe the source water protection program. Main objectives of this site visit included: obtaining an accurate GPS location of the water supply intake, inspecting the integrity of the intake, and documenting water operator's source water concerns. A windshield survey of the immediate watershed vicinity was also undertaken, and further watershed survey trips have been made.

##### **Intake Integrity**

Friendsville's intake on the Youghiogheny extends about 15 yards out into the river and was originally installed in 1973. The intake is screened and lies along the river bottom, which is mostly cobbles and boulders. River water flows by gravity from the intake in two 4-inch ductile iron pipes into two 8-foot diameter wet wells just outside of the plant. The intake line is relatively short (30 yards total) because the plant is adjacent to the river. From the wet wells water is pumped into the plant (MDE – CPE 1998). Water plant officials did not express any concerns with the intake. The intake and line receives very little maintenance, however, MDE personnel did not observe any problems with the intake structure, or raw water line.

##### **Concerns and Site Visit Observations**

In addition to looking at the intake structures and land immediately around the plant, a drive through the immediate watershed was done, and a discussion with plant operators was undertaken to determine concerns and potential sources of contamination. Below is a list of concerns that reflect operator concerns and MDE observations:

1. Deep Creek Hydroelectric Generating Station, dam releases can change turbidity quickly.
2. Septic systems in Town above the river and intake.
3. Several Waste Water Treatment Plants (WWTPs) upstream.
4. Interstate 68 bridge and Maryland Route 42 bridge crosses river above intake (spill concerns).



5. Road salt runoff from bridge crossings.
6. Storm water from Friendsville runs directly into river.

## **E. WATERSHED CHARACTERIZATION**

### **Source Water Assessment Area Delineation Method**

An important aspect of the source water assessment process is to delineate the watershed that contributes to the source of drinking water. A source water protection area is defined as the whole watershed area upstream from a water plant's intake (MDE – SWAP, 1999). Delineation of the source water area was performed by using ESRI's ArcView Geographic Information System (GIS) software, utilizing existing GIS data, and by collecting location data using a Global Positioning System (GPS). A GPS point location was taken at Friendsville's intake during the initial site visit and differentially corrected (for an accuracy of +/- 2 meters) at MDE. Once the intake location was established, the watershed was delineated based on existing MD Department of Natural Resources digital watershed data and MD State Highway Administration digital stream coverage. Digital USGS 7.5 topographical quad maps were also used to perform "heads up" digitizing, or editing, of watershed boundaries when needed.

### **General Characteristics**

The Youghiogheny River has the distinction of being the only river in Maryland that does not flow into the Chesapeake Bay. The intake watershed encompasses 296 square miles of mountainous, forested land in western Maryland and a portion of West Virginia. The entire watershed is located in the Allegheny Plateau physiographic province, which is characterized by highlands that have steep peaks, ridges, and plateaus, and are deeply divided by valleys (USGS Circular 1202, 2000). In West Virginia, and the southern Youghiogheny basin (Oakland area), high, rounded mountains characterize the watershed, and most high order streams flow sluggishly through broad, low gradient valleys (WVA-DEP, 1998). Most of the land in this portion of the watershed is a patchwork of forests and low-intensity agriculture, especially hay and buckwheat fields. Above Millers Run, where the Wild River designation begins, the Youghiogheny begins to cut through a steep forested valley. Falls and rapids are fairly common on the river in this section of the watershed starting at Swallow Falls. Here the river is used as a whitewater recreation source. Just north of Sang Run the river runs free and wild, dropping in elevation at times by over 100 feet per mile. The land is rugged, inaccessible, and heavily forested, especially in the river valley gorge. There are also some crop fields, pasture, and past coal mining in this area. Small-order tributaries in this portion have high slope gradients and are swift moving mountain streams.

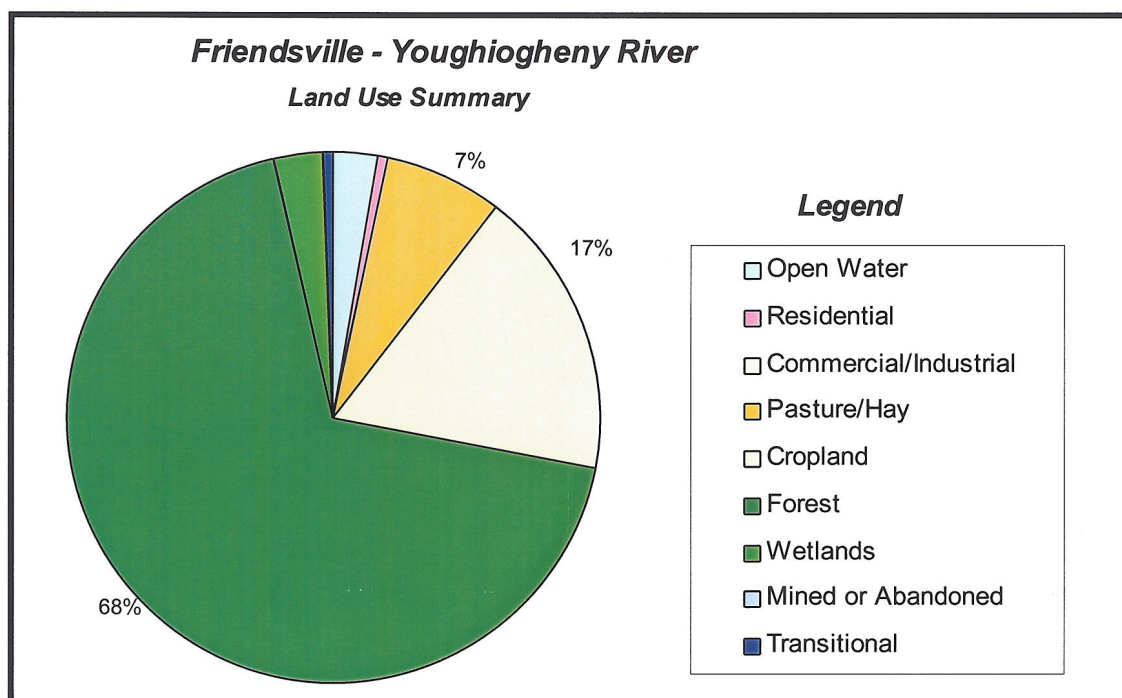
Below is a summary of land use in the entire Youghiogheny River basin upstream of the Friendsville intake. This data is from the Multi-Resolution Land Characterization Consortium (MRLC), a partnership of federal government agencies that produce or use land cover data. The data is based on 30-meter Landsat thematic mapper (satellite) data, and is commonly referred to as the National Land Cover Data set. The MRLC data was designed for use in hydrologic and water quality models.

Following is the MRLC land use for the Youghiogheny source watershed:

Table 1 – MRLC Land Use Summary.

Land Use	Total Area in Acres	Percent of Total Watershed
Open Water	4991.1	2.7
Residential	1289.5	0.7
Commercial/Industrial	143.5	0.1
Pasture/Hay	13622.7	7.3
Cropland	32539.8	17.3
Forest	128521.8	68.4
Wetlands	5401.0	2.9
Mined or Abandoned	386.2	0.2
Transitional	867.8	0.5

Chart – 1. Land Use Summary.



### Localized Characteristics

Immediately upstream of the intake is the Friendsville town center (see Figure 1 & 6), which lies on the eastern bank of the river. Approximately 55 acres of residential and small commercial property drain into the Youghiogheny River upstream of the intake. There is no storm water management in the Town, and as a result runoff enters the river directly. The Town had a combined storm water and sewage sewer up until the early 1970's, but now a sewage-only line delivers waste to the Friendsville WWTP, which is just downstream of the water intake. According to the operator, there are also several homes upstream of the intake that are on private septic systems.

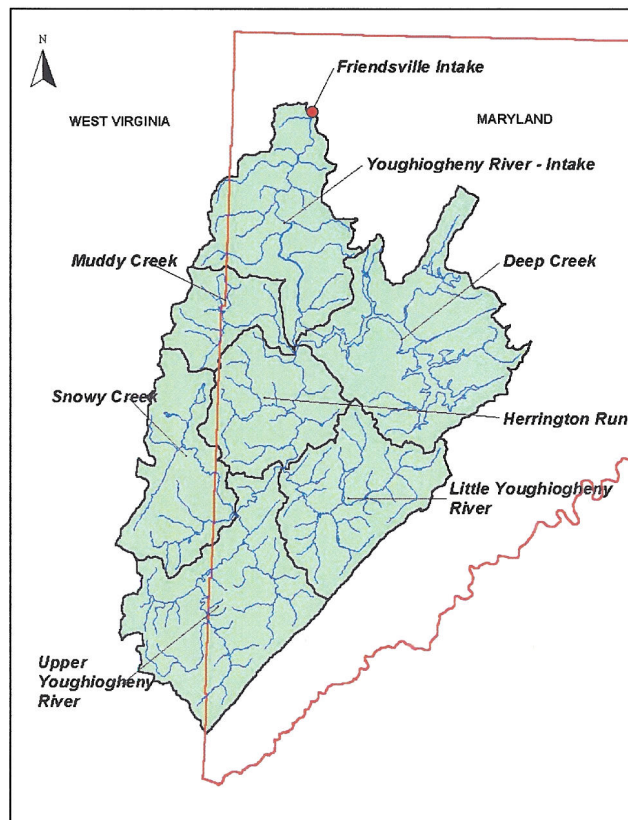


Several bridges cross the Youghiogheny River in the vicinity of Friendsville. Approximately ¼ mile above the intake, MD Route 42, known locally as Friendsville – Hoyes Rd., crosses the river and leads directly into the heart of town. A small unnamed tributary, the closest to the intake, enters near this bridge crossing, and drains a mix of forested and agricultural land, including a corn field along the west bank of the river. The Interstate 68 bridge is approximately 0.45 miles above the water intake. Interstate 68 is the major east-west artery through western Maryland. There is also a bridge crossing 0.6 miles upstream of the intake, which is an exit ramp that turns into Route 42 south. Beyond these bridge crossings the river valley becomes steeper, more forested, and there are several tracts of land designated as Youghiogheny River Scenic and Wild corridor.

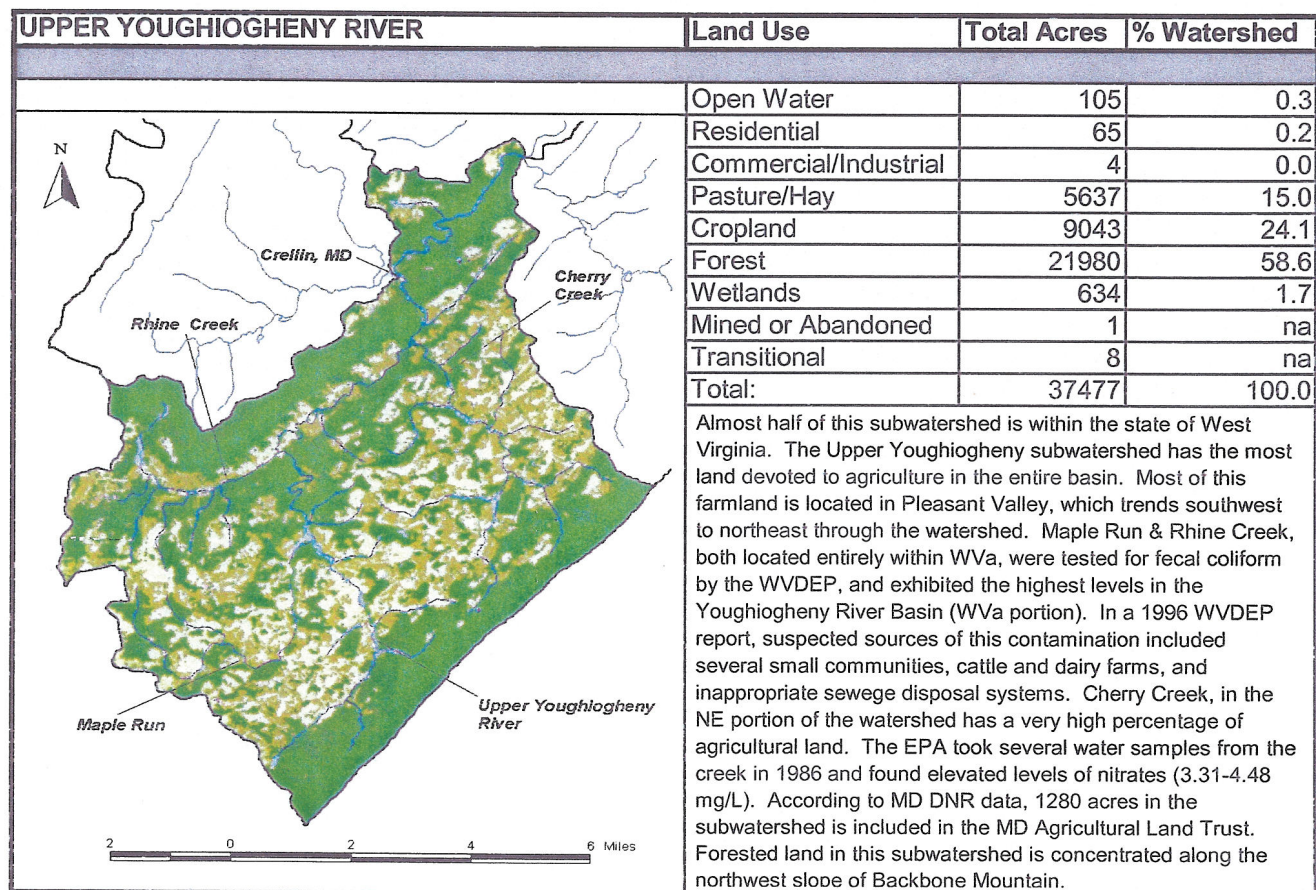
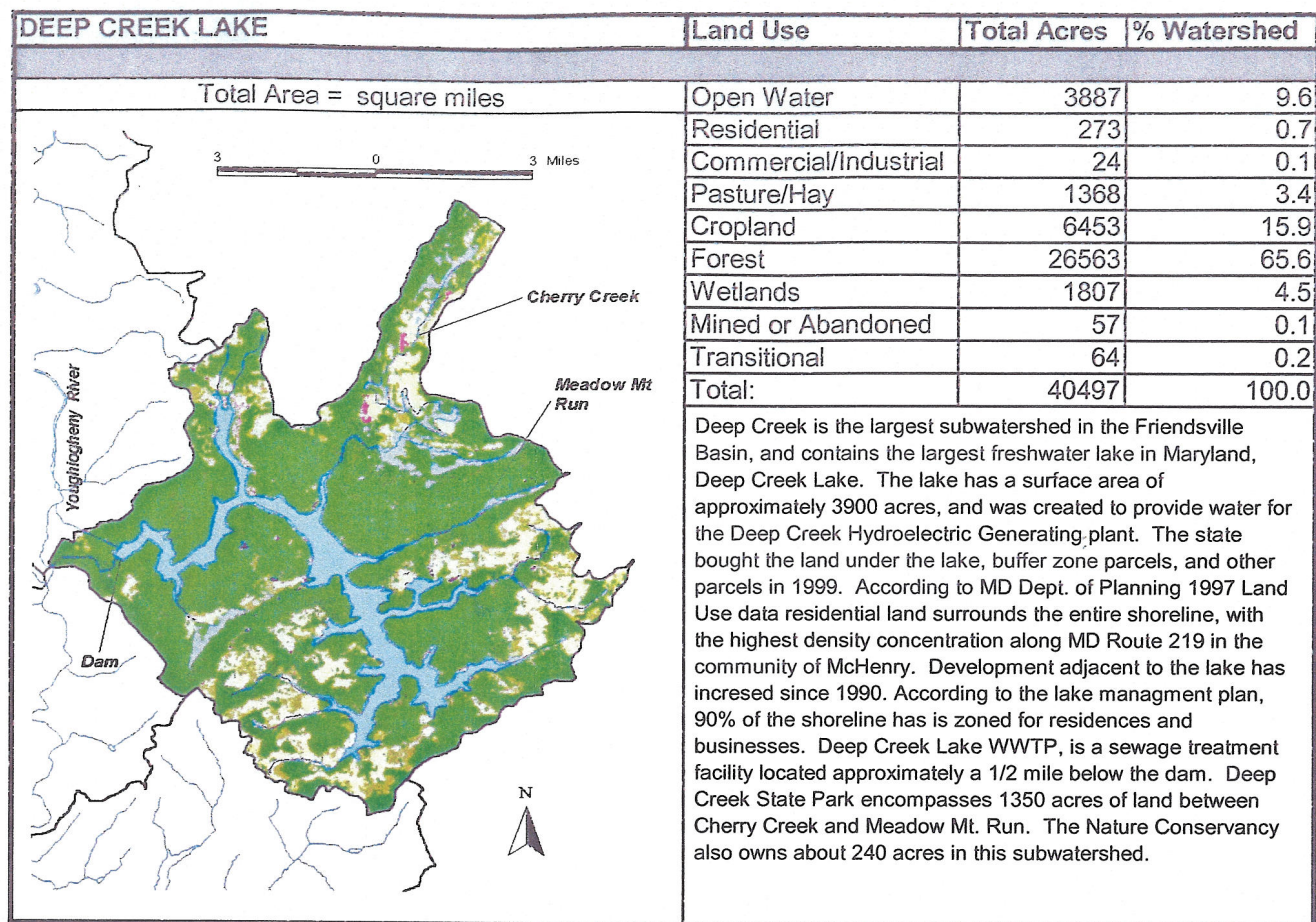
### **Subwatersheds**

Maryland's Source Water Assessment Plan states that larger source water areas will be segmented into smaller subwatersheds to assist in the assessment and identify watersheds of concern. The Friendsville Youghiogheny source watershed is segmented into 7 subwatersheds for this assessment report. These subwatersheds were delineated based on existing watershed boundaries provided by the West Virginia Department of Environmental Protection and Maryland Department of Natural Resources. Watersheds boundaries were both created and modified (existing data) based on digital topographic maps for both West Virginia and Maryland. Each subwatershed is depicted and described in the following pages. For the small maps in the following section refer to the land use legend in Figure 2, in Appendix. Below is a map depicting the entire Friendsville watershed (source area) with the seven subwatersheds:

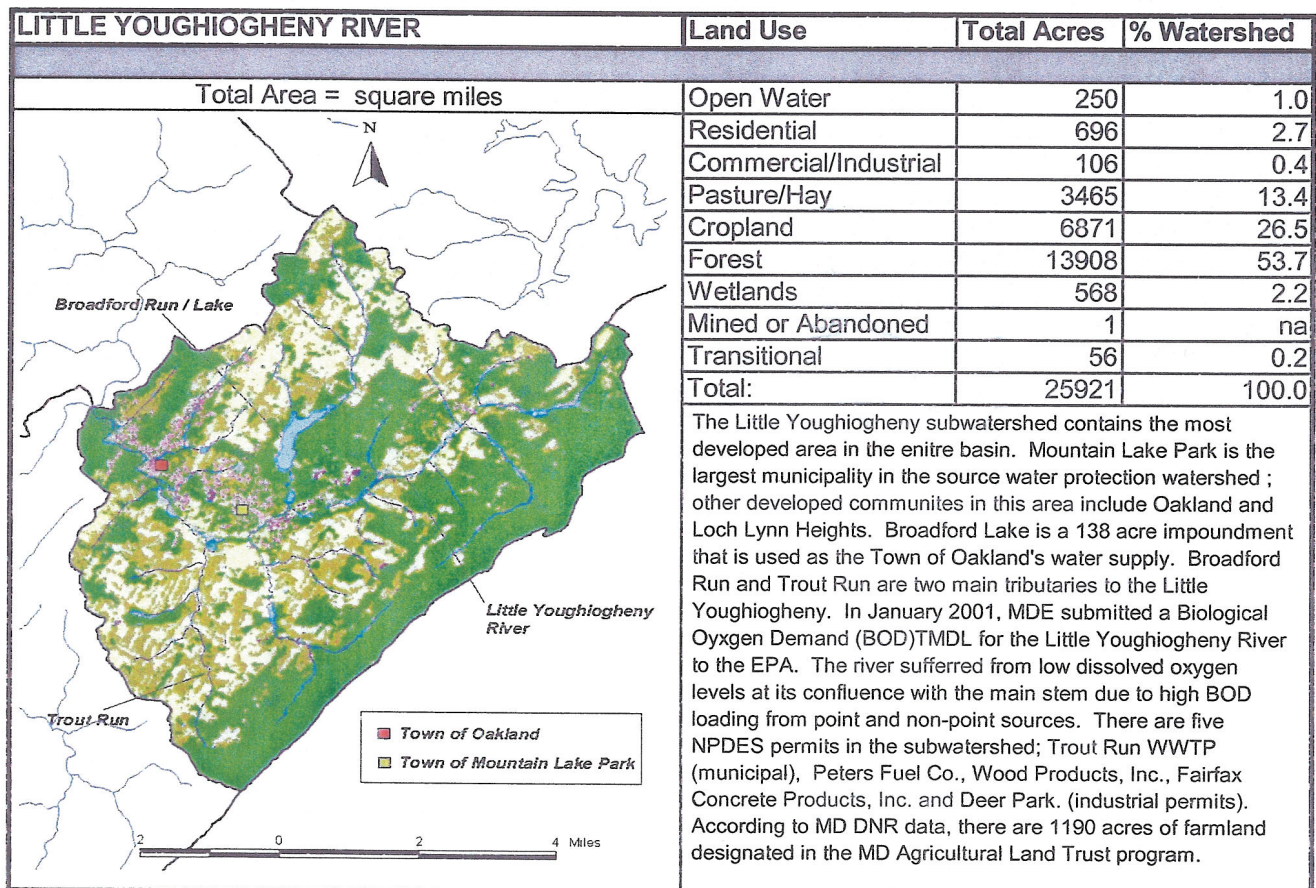
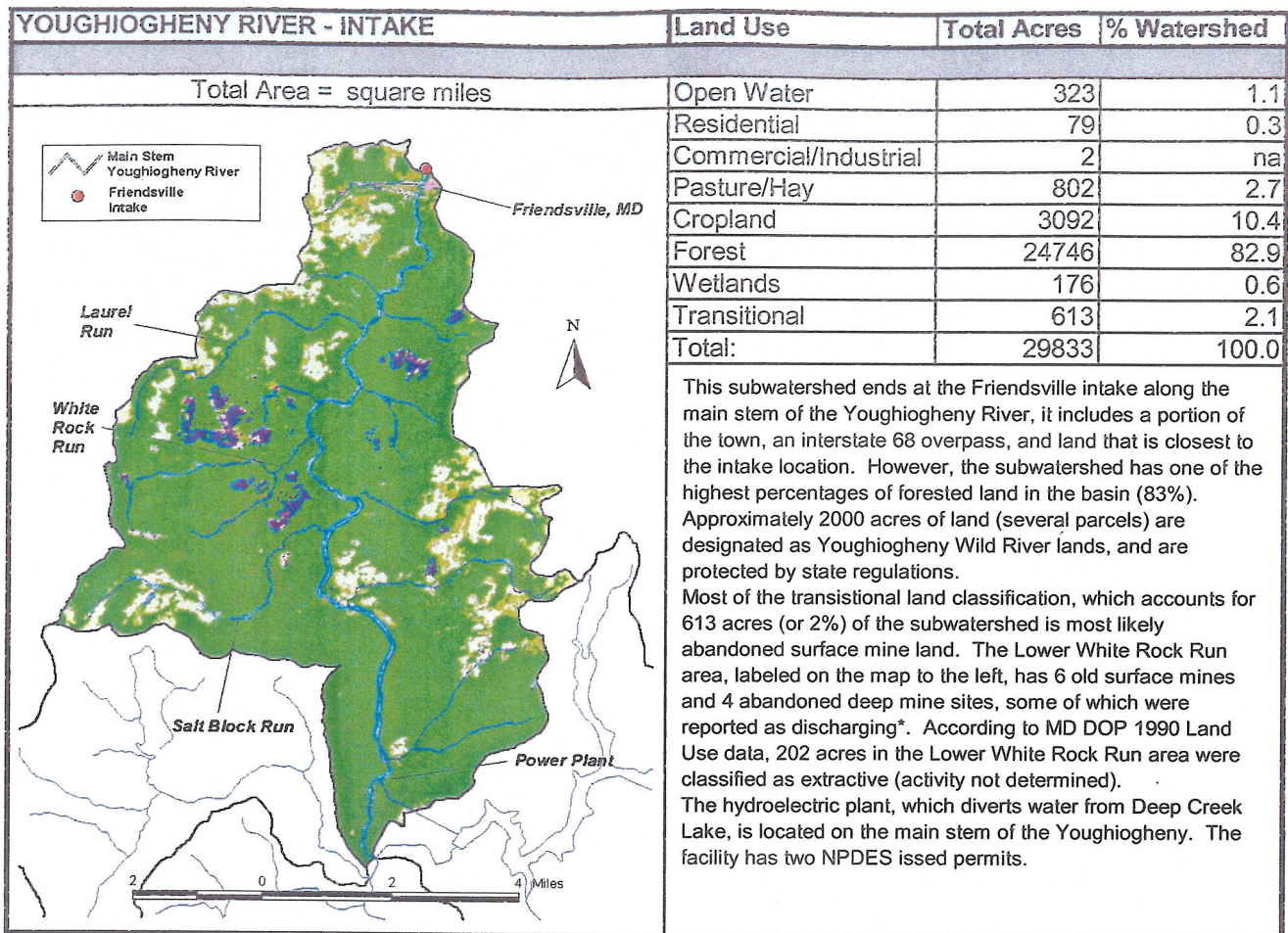
**Figure B. Subwatersheds**



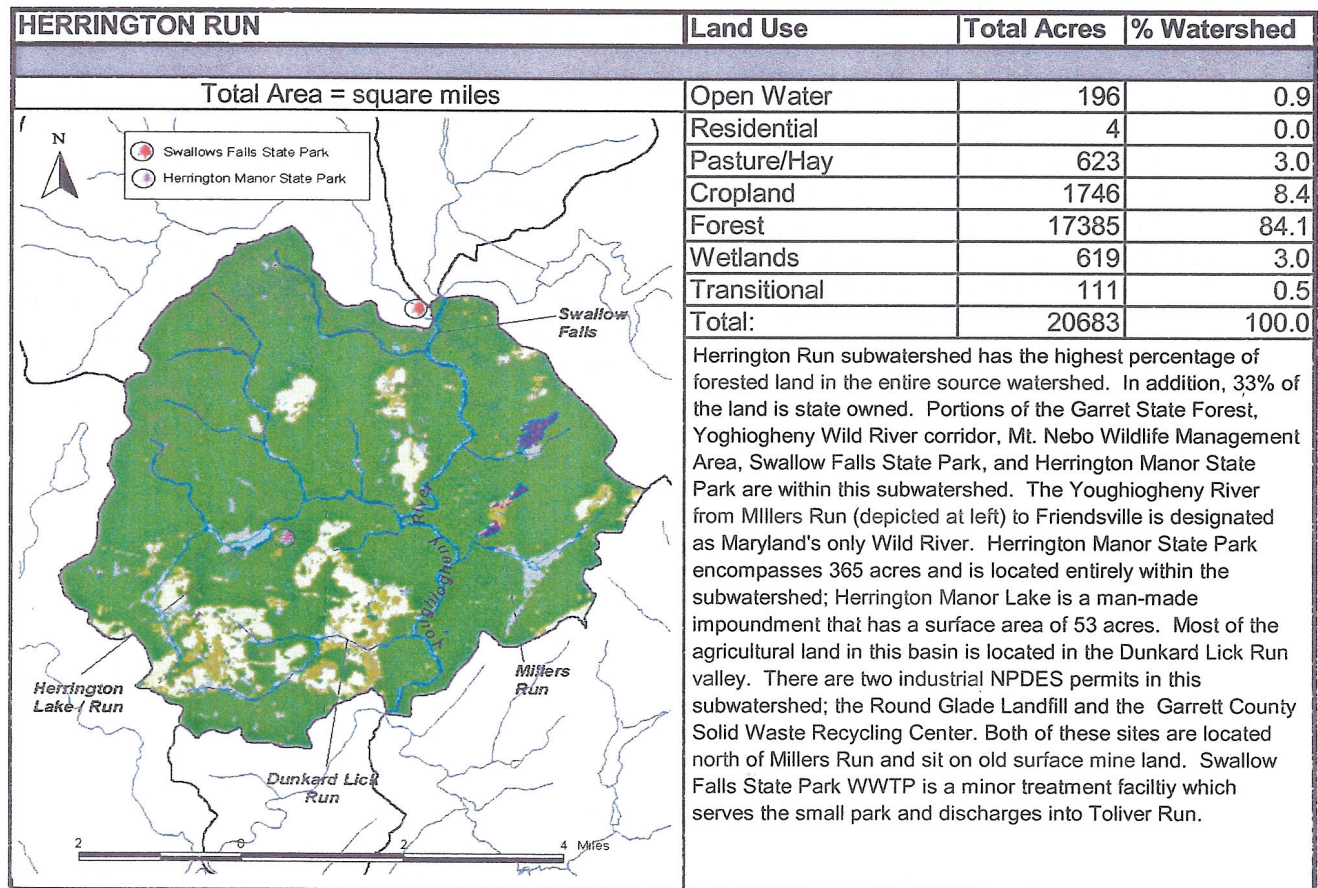
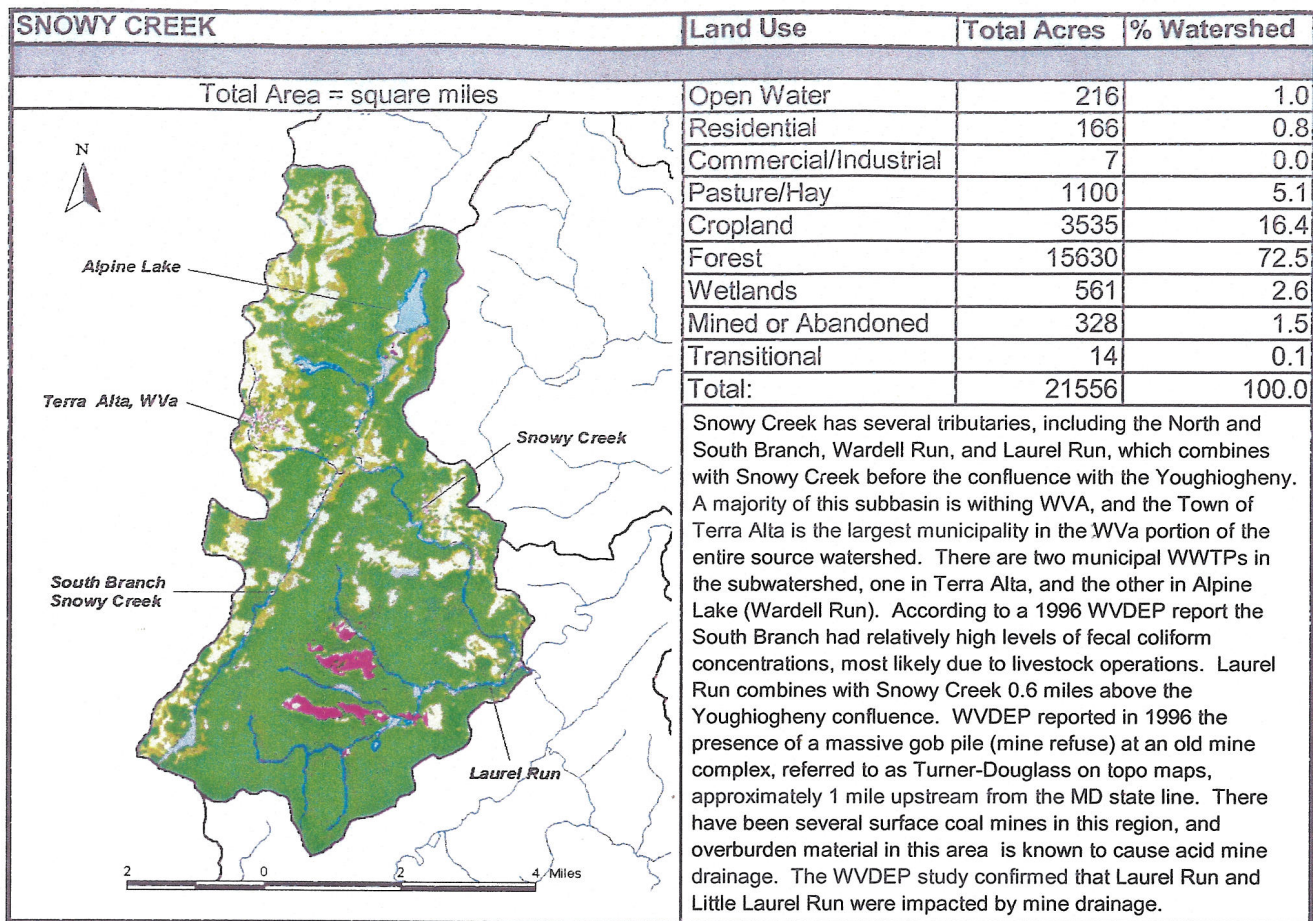




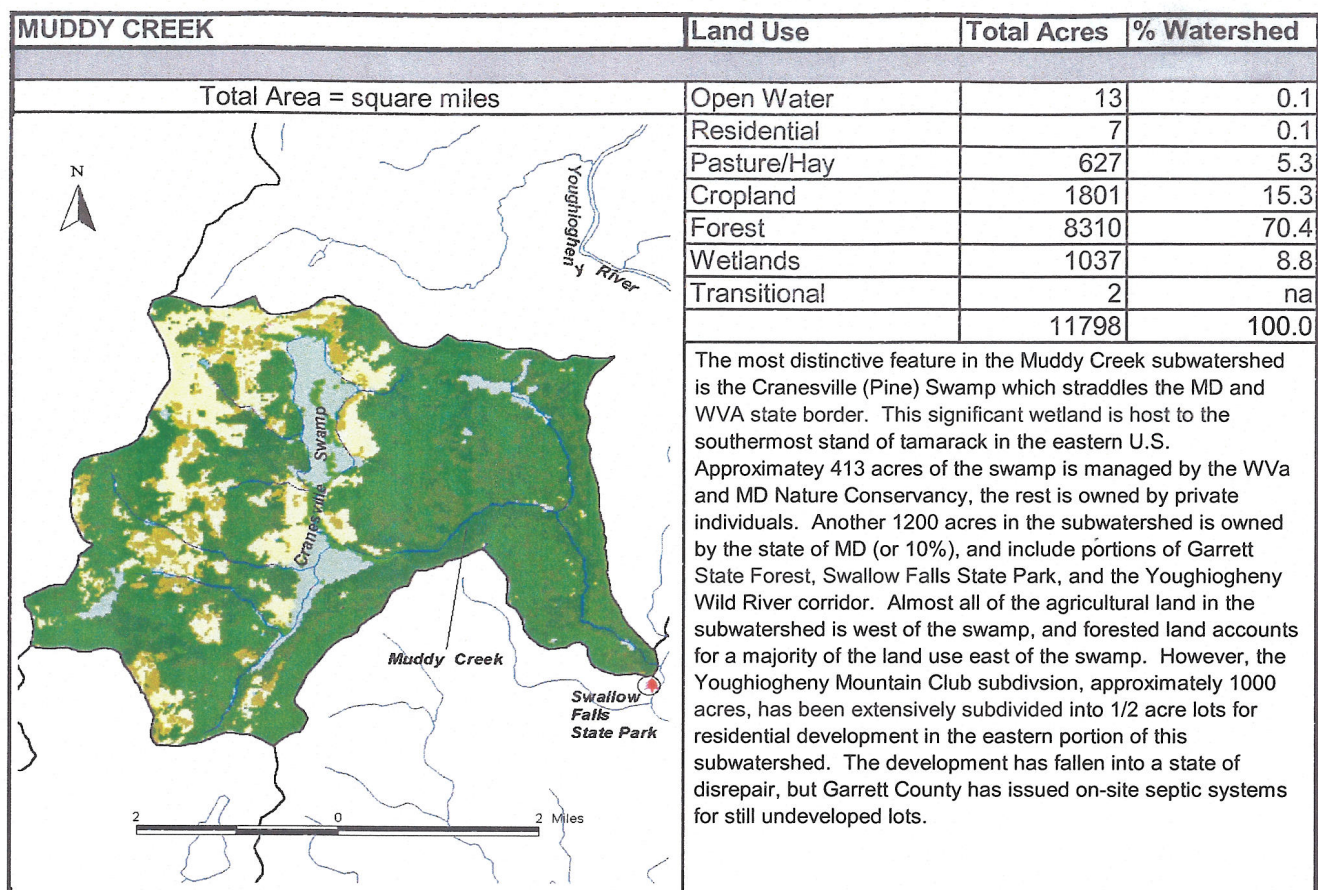














## **F. POTENTIAL SOURCES OF CONTAMINATION**

Potential sources of contamination are classified as either point or non-point sources. Examples of point sources of contamination include landfills, discharge permits, large scale feeding operations, and Superfund Sites. These sites are usually associated with industrial or commercial facilities that use chemical substances that may, if inappropriately handled or discharged, contaminate surface water sources from a specific location. Non-point sources of contamination are associated with certain types of land use practices such as the use of pesticides, application of fertilizers or animal wastes, or septic systems that lead to groundwater contamination.

### **Non-Point Pollution Sources**

Analysis of aerial photography and land use data suggests that a majority of the Friendsville source watershed is forested. Forested land is less likely to contribute non-point sources of pollution than residential, agricultural, and urban land. However, there are some urban areas within the watershed, a substantial amount of agricultural land, and areas of past coal mining.

### ***Agricultural Land Use***

Almost 25% of the Friendsville source watershed is used for agricultural purposes (crops, 17.3%, pasture/hay fields, 7.3%). Land used to grow crops can be a source of nutrients (from fertilizers), and synthetic organic compounds (pesticides). Agricultural land can also be a source of sediment runoff from erosion. Most cropland in Garrett County is used for oats or hay production (DOA Census of Agriculture, 1997). However, analysis of aerial photography shows areas of significant row cropping. Pastures used to graze livestock can be sources of pathogenic protozoa, viruses, and bacteria from animal waste, and stream bank erosion when animals have unfettered access to watercourses. Animal waste from pastures can also contribute to excessive nutrient (nitrogen and phosphorous) loading.

Most of the agricultural land in the watershed is located in an area known as Pleasant Valley, which runs southwest-northeast along the western slope of Backbone Mountain (see Figure 2). The majority of this valley is located within Maryland, and the upper reaches of the Youghiogheny, Cherry Creek, and the Little Youghiogheny River drain the valley. Consequently, the Little Youghiogheny, and Upper Youghiogheny subwatersheds have the highest percentages of agricultural land use in the entire basin. Elevated concentrations of bacteria due attributed to dairy and cattle operations have been noted in Maple Run and Rhine Creek, both in the Upper Youghiogheny subwatershed (WVDEP, 1998). In the past, high nutrient concentrations have been found in Cherry Creek, another tributary to the Upper Youghiogheny, located in the heart of Pleasant Valley. The Little Youghiogheny River has had water quality problems associated with agricultural land use as well. Two TMDLs (Total Maximum Daily Loads) have been set in this subwatershed. Broadford Lake, which is used by the Town of Oakland for water supply, had a TMDL submitted to the EPA in 1999 due to high levels of nutrients found in the lake. Also, a TMDL was completed for the lower Little Youghiogheny because of seasonally low dissolved oxygen levels attributable to Biological Oxygen Demand (BOD) and nutrients. Excessive bacteria levels have also been found in the Little



Youghiogheny and are partially attributed to non-point runoff from agricultural land (MD 305(b) Report, 2000).

Eighty-one acres of land are classified as “Agricultural Buildup” in the Maryland portion of the basin according to the Maryland Department of Planning’s 1997 land use data. This land use classification is defined as breeding facilities, storage facilities, farm ponds, and commercial fishing areas. There are approximately 6 sites located in the Maryland watershed.

#### ***Urban & Residential Land Use***

Urban development can increase the amount of runoff that enters streams and lakes. Impermeable surfaces, such as parking lots, keep water above the ground surface, accumulate it, and increase the amount that runs off the land. The largest pollutant load from urban areas to receiving streams is sediment (EPA, web site). In addition, other contaminants associated with urban runoff are pesticides and fertilizers (from residential land), toxic chemicals (from commercial and industrial runoff) and oil and grease (from automobiles). Most of the developed land in the basin is within a sewer service area, but scattered rural residences and small communities, of which there are many, rely on private septic systems. Improperly functioning septic systems can be a major source of contamination for pathogenic bacteria, protozoa, and viruses. In certain cases, even properly functioning septic systems can be a source of the aforementioned contaminants.

According to the MRLC land use data, less than one-percent of the entire source watershed is urban, commercial, and/or residential land. The MRLC classifications may underestimate the land area under these classifications, so local land use was also analyzed. MD DOP data for Garrett County in 1997 illustrates that more land area is classified as urban/residential. According to the data, approximately 13,000 acres are either residential, commercial, industrial, institutional, or open urban land. In the Maryland portion of the watershed that accounts for almost 9% of the total land area.

Approximately 40% of the population in Garrett County resides in the southern Youghiogheny River basin, upstream from Herrington Run and Millers Run (Garrett County Water & Sewer Plan, 1997). This area includes the Oakland/Mountain Lake Park/Loch Lyn Heights area, which is the most heavily populated, and only “urban” area of significance, within the basin. Terra Alta, a town of approximately 2000 people, is the largest community located in West Virginia. There are several small communities in the West Virginia portion of the basin, but none significant. The village of Elgon located in the Upper Youghiogheny subwatershed, however, was reported to have inadequate septic systems in a 1998 WVA DEP study.

The Deep Creek Lake area has been the center of growth in Garrett County since the late 1980’s (MD DNR, 2001). According to 1997 land use data, a majority of the lakes shoreline is low to medium density residential. More than 90 percent of the properties adjacent to the lake are within the Lake Residential zoning district (single family houses), however there are areas of commercial and resort development. The two communities of McHenry and Thayerville are classified as “town centers” and are located in the northern section of the lake. A majority of the residences and businesses in these areas are



sewered, but there are residential areas adjacent to the lake on septic systems, especially along the south shoreline.

Although Friendsville is a relatively small community, its location immediately above the intake renders the area as a potential source of contamination. Some residences within the watershed are not on the sewer system so there is the potential of septic system discharge making its way into the river. Additionally, storm water from the town discharges directly into the river (Personal Communication, Plant Operator).

### *Mining*

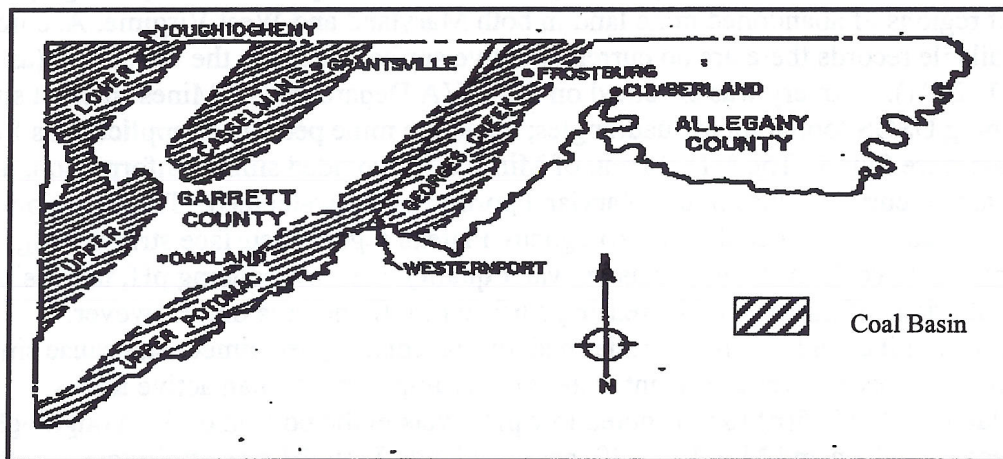
In general, mining has the greatest influence on surface and ground water quality and aquatic habitat of any single land use in the Allegheny and Monongahela River Basins, which includes the Youghiogheny River (USGS, 2000). The Youghiogheny River basin has a long history of coal mining. Analysis of land use maps and aerial photography depict regions of abandoned mine land in both Maryland and West Virginia. According to available records there are no currently active surface mines in the watershed (as of May 1, 2001). A query was executed on the WVA Department of Mines Internet site by searching USGS topographic quadrangles; no active mine permits or applications for permits were found. The MD Bureau of Mines also provided similar information, and there are no current mines in the Maryland portion of the watershed. The most common method used to extract coal in the Allegheny Plateau region is surface strip mining. Strip mining can have deleterious effects on water quality, such as reducing pH, increasing the concentrations of metals, and increasing surface runoff and erosion. However, abandoned mine land that is not reclaimed, or inadequately reclaimed, can cause similar and in some cases more significant water quality impairments than active mines. Maryland's 2000 305(b) Report noted low pH levels in the portion of the Youghiogheny between Sang Run and MD Route 39, near Oakland. Low PH was attributed to past mining activities. Also, pH swings occasionally occur at the Friendsville Water Plant, according to the plant operator, which may also be attributable to rainfall or alkalinity changes.

The WV-DEP has documented that Laurel Run (Snowy Creek subwatershed), which discharges into Snowy Creek above the Town of Crellin, has had water quality problems attributable to abandoned coalmines. This has led to Laurel Run's placement onto West Virginia's 1998 303(d) list of impaired waters. According to the MRLC land use cover data set, a total of 328 acres, or almost 5%, of the watershed is classified as mined or abandoned mine land. Most of this area lies in an area known as Brushy Knobs and between Little Laurel Run and an unnamed tributary (see Figure 2). The last mining permit in the basin was issued in 1988 to the New Allegheny Corporation. There were three NPDES discharge permits associated with this 35-acre operation. The property was released from bond in 1993, and there have not been any active mines in the basin since. However, the cause of water quality problems in Laurel Run is from old abandoned mine land. According to the WV-DEP, and an analysis of aerial photos, there is a large, abandoned mining complex adjacent to Laurel Run approximately 1 mile west of the Maryland State line. It was reported in 1998 that this complex had a massive gob pile, which is a mound of refuse mine material (WV-DEP, 1998). Aerial photography also depicts several large surface mines (either abandoned or reclaimed) to both the east and west of the complex in both states. Laurel Run is the only stream that has been



documented as having water quality impairments due to abandoned mine land in the West Virginia portion of the Youghiogheny River basin.

There are two Maryland coal basins in the source watershed, the Upper and Lower Youghiogheny Basins. The “lower” basin is located in the extreme northwest corner of Garrett County and extends in neighboring Pennsylvania and West Virginia. The basin is approximately 12 miles long and has a maximum width of six miles. According to the MD Bureau of Mines mining in this basin has been minimal in the past, but has been increasing, and accounts for approximately 12.4% (107 million tons) of the recoverable coal resources in the state. Sang Run geographically separates the lower and upper basins. The Upper Youghiogheny Coal Basin contains the thinnest sequence of coal measures in the state and mining activity has been minimal to date. The upper basin accounts for 6.9% (54.3 million tons) of the state’s recoverable coal resources. See map below for the general location of these basins:



The Youghiogheny Intake subwatershed has approximately 613 acres of “transitional” land. After reviewing old Bureau of Mines maps, 1990 MD DOP land use data, and aerial photography, most of these transitional parcels are abandoned or reclaimed mine land. In the USGS Friendsville 7.5 Quad alone there are 18 identified old deep mines (below surface) within the intake watershed. According to an old abandoned mine report at least two of these mines had a discharge (MDE-BOM, 1979). White Rock Run’s watershed, located within the Friendsville quad and the Youghiogheny Intake subwatershed, particularly stands out as an area that was heavily mined. According to MDE Bureau of Mines information this small watershed had six old surface mining permits and four old deep mine sites. One site, referred to as Y-19, had three discharging deep mines. White Rock Run’s confluence with the Youghiogheny is approximately 6 miles above the Friendsville intake. There are other old mining sites within the Friendsville source watershed basin, but the only other area noted for low pH levels due to past mining activity is Cherry Creek in the Deep Creek subwatershed (MD 305(b) Report, 2000). (Not to be confused with Cherry Creek in the Upper Youghiogheny subwatershed).

### *Forestry*

A timber harvest operation can disturb 8-10% of the total work area by road building and creating landing sites. These areas, if not maintained, can contribute to erosion and



sedimentation in receiving waterways. Almost 65% of the watershed is forested, so forestry harvest operations are likely. Information on forestry harvests in West Virginia is limited, as well as in Maryland. However forestry harvest operations have been increasing in West Virginia, and most likely occur periodically in the Youghiogheny watershed in both states. Sale of timber on Maryland state land follows strict guidelines to ensure against environmental degradation, and all permitted harvests on private land in Maryland must comply with state regulations and inspections.

### **Point Discharge Pollution Concerns**

#### ***Wastewater Treatment Plants***

There are seven wastewater treatment plants in the Friendsville source watershed. Of these, five are in Maryland and two are located in West Virginia. Below is a brief description of information available on each plant:

1. **Oakland WWTP.** This plant is owned and operated by the Town of Oakland. The plant is a series of sedimentation and treatment lagoons and has a design capacity of 0.9 MGD. Average flow from 1998 to September 2001 was 0.46 MGD. One of the lagoons uses an alternative technology system for nitrogen nutrient removal, and the final effluent discharge is disinfected by UV radiation. Oakland completed the construction of the plant in 1988. Prior to that, the town had a combined sewer/storm water collection system that discharged all of the sewage untreated into the Little Youghiogheny at various locations. Discharge is now directly into the Youghiogheny River below the confluence with the Little (Garrett County Water & Sewer Plan, 1997).
2. **Trout Run WWTP.** The Trout Run is owned and operated by the GCSD, and serves the Mountain Lake and Loch Lyn Heights communities. The plant is also a lagoon treatment facility with a design capacity of 0.9 MGD. Improvements have been made to the plant in the recent past. In 1989 the plant underwent major improvements to increase capacity because the state placed a moratorium on new sewer connections to the system. A storage facility was constructed to hold sewer effluent during dry periods when discharge to the stream could not occur. Also, a hydrographic control release system was added to regulate the discharge into the Little Youghiogheny during the months when the effluent discharge has the greatest impact on stream conditions. In 1996 collection system improvements were made to reduce infiltration and inflow problems in the pipes. However, the TMDL for the Little Youghiogheny River (2000) still listed Trout Run's effluent as a cause of observed low dissolved oxygen in the river (Garrett County Water & Sewer Plan, 1997).
3. **Deep Creek WWTP.** The GCSD owns and operates this alternative treatment system that has been in place since 1985. The service area includes residences and businesses around Deep Creek Lake. The 0.6 MGD design capacity plant has a collection system that uses a grinder / pump / pressure sewer line with only small portions of gravity sewers. The plant employs the oxidation ditch method of treatment followed by clarification and UV disinfection. This system is essentially at its design capacity limit (some capacity has been already designated to new development). Average flow from 1998 to September 2001 was 0.57 MGD. Large holding tanks have been constructed and plans have been



formulated for a new treatment facility at a site called White Face farm. Effluent is discharged into Deep Creek below the dam, approximately ½ mile upstream of the confluence with the Youghiogheny (Garrett County Water & Sewer Plan, 1997).

4. **Town of Crellin WWTP.** The GCSD also operates the Town of Crellin's wastewater treatment plant. The plant discharges effluent directly into the Youghiogheny approximately 4 miles above the Town of Oakland. The plant services approximately 125 households and has a design capacity of 0.028 MGD. The plant employs a series of slow-rate sand filters and UC disinfection. According to MDE inspection personnel the plant usually operates within the limits of its permit, and there are no known problems with the collection system or treatment process (Pers. Comm., Western MD Field Office). A permit renewal was filed in February 2000. The permit engineer estimated that the dilution of the background flow to the permitted flow is very high (76%) during low flow conditions (7Q10), which results in a highly diluted effluent. Between January 1997 and October 1997 effluent from the plant had an average fecal bacteria concentration of 79MPN/100 ml, and a pH range of 6.5 to 7.3.
5. **Swallow Falls State Park.** This small plant serves the state park and is operated by the Maryland Environmental Service. The plant consists of an oversized lagoon, sand filter, and UV disinfection, and has a design capacity of 0.06 MGD, however, average yearly daily discharge is 2,800 gallons per day (1998-2000). Discharge from the plant is limited to winter months only, when there is enough flow in the stream to dilute the effluent in order protect water quality. The permit was reissued in 1998 and the permit engineer from MDE noted the absence of noticeable effects of the discharge into Toliver Run and the Youghiogheny River. The discharge is located approximately ¼ mile above the confluence with the Youghiogheny.
6. **Terra Alta WWTP.** The Terra Alta WWTP is located in Preston County, West Virginia. The plant services approximately 650 households and has a design capacity of 0.25 MGD. The effluent is discharged into the North Branch of Snowy Creek just below the town, and is approximately 1.65 miles above the confluence of the South Branch and Wardwell Run. The plant has had infiltration/inflow problems in the past; in 1998 the WVA-DEP documented problems in the sewer collection system and occasional discharges of incompletely treated sewage into Snowy Creek. The town and WV-DEP were working on a solution to correct this problem (WV-DEP, 1998).
7. **Alpine Lake Public Utility WWTP.** The Alpine Lake WWTP is also located within the Snowy Branch subwatershed in Preston County, West Virginia and services the small community around Alpine Lake and a resort/conference center. The plant is designed to treat 60,000 gallons of sewage a day. The effluent is discharged into Wardwell Run, below the lake, and approximately 1.9 miles above the confluence of Wardwell run and the main branch of Snowy Creek. Infiltration/Inflow problems have also been documented at the Alpine Lake plant (WV-DEP, 1998).

Wastewater treatment effluent can be a source of pathogenic bacteria, protozoa, and viruses. All of these plants are located a significant distance upstream from the



Friendsville intake, especially the ones located in West Virginia. Please refer to Figure 3 in the Appendix for locations of these plants.

#### ***Industrial Discharges (NPDES Permits)***

There are seven facilities that discharge wastewater into the Friendsville source watershed. All of these NPDES discharges are within Maryland, with four of them located in the Little Youghiogheny subwatershed. Below is a brief description of each permit:

1. **Round Glade Landfill.** This landfill was used for more than twenty years by the county, but was shut down in the mid-90's. Leachate from the landfill is pumped to the Deep Creek WWTP. The only remaining discharge from the site is storm water runoff, drainage from the collapsed opening of an abandoned coal mine, and an upwelling area on the site. The county is trying to address the runoff problems by developing a wetland treatment process, as part of the Round Glade capping project (Garrett County Water & Sewer Plan, 1997). Round Glade Landfill and the new landfill listed below are both located near Round Glade Run, in the Herrington Run subwatershed.
2. **Garrett County Solid Waste & Recycling Facility.** This landfill was put into operation in 1994. It is located approximately a half mile from Round Glade and is approximately 200 acres. Leachate from this landfill is collected and pumped to the Deep Creek WWTP also. There are two storm water management ponds that collect storm water runoff from the landfill. These two ponds each have a permitted discharge point (01 & 02). One pond discharges in Round Glade Run and the other into a unnamed tributary south of the landfill complex. Both outfalls average 3-5 gallons per minute depending on the weather conditions. It appears that the landfill was created on top of an old surface coalmine site.
3. **Deer Park Spring Water Company.** This facility is authorized to discharge bottle washing rinse water, distillation unit blowdown, water storage tank overflow, excess spring water, and storm water runoff into the Little Youghiogheny River. Average permitted discharge is 18,000 gallons per day. This facility was listed in the Little Youghiogheny TMDL as a source of BOD contamination. This permit may be no longer active because production of bottled spring water at this original Deer Park spring ceased in 2000.
4. **Wood Products, Inc.** This facility is a sawmill that produces cut hardwood and kiln dried lumber. It is located in the Little Youghiogheny subwatershed and has three discharge points. The permit authorizes the facility to discharge storm water into the Little Youghiogheny River from outfalls 01 & 02. Discharge 01 is from a storm water pond that collects runoff from stored logs and waste sawdust. Discharge 02 is for storm water and is a ditch located along railroad tracks. Both of these discharges are dependant upon weather conditions. Also, boiler water blowdown is injected into the groundwater (at discharge 04). In 1990, the sawmill eliminated a pressure treatment process that used CCA (Chromium, Copper, Arsenic), an additive that was a source of arsenic pollution.
5. **Fairfax Concrete Products.** This is a ready-mix concrete and concrete block manufacturing facility. The facility is located on Route 219 and has two discharge points; both into the upper reach of Trout Run (MDE – TMDL, 2000).



Discharge 01 is from a storm water management pond and has a maximum daily discharge of 700 gallons. Discharge 02 flow is dependant upon the weather conditions. Combined both outfalls are permitted to discharge truck wash water, boiler blowdown, block plant drainage, garage drainage, storm water, and water softener backwash.

6. **Peters Fuel Corporation.** Includes 2 discharge permits authorizing the discharge of treated garage floor drainage, and storm water runoff. Located in the Little Youghiogheny subwatershed. Peters Fuel Co. is a truck repair stop and fuel storage facility with several above ground storage tanks, which are surrounded by concrete dikes. They have a maximum storm water discharge requirement of 20 mg/l per day of petroleum hydrocarbons, and must maintain a pH between 6 and 9.
7. **Deep Creek Hydroelectric Generating Station.** The hydroelectric plant is owned by Reliant Energy Maryland Holdings, LLC. There are two outfall points and both discharge into a raceway just upstream of the Youghiogheny. One discharge is non-contact cooling water and floor drainage (01), this discharge is limited to 231,000 gallons per day. The second discharge (02) is storm water flow from a transformer area. The permit was reissued in 1999. In 1994, the permit was updated and a sample taken from the 01 outfall showed no toxic contaminants present and very low concentrations of nutrients and fecal coliforms.

#### ***Transportation Related Concerns***

The rugged terrain of Garret County and neighboring West Virginia limits the amount of transportation arteries in the Friendsville intake watershed. However, the major east-west transportation corridor through Maryland passes very close to the intake. Interstate 68 was constructed in sections in the 1980's. Transportation of hazardous material is probably a common occurrence along this route, and the water plant operator voiced concern over potential contamination at the intake due to a spill. The overpass is within the Town's municipal boundary and is approximately 0.45 miles upstream of the intake (see Figure 6). A toxic spill on this overpass could be a serious threat to Friendsville's intake. In addition to the I-68 overpass, there is an exit ramp bridge (that turns into Friendsville-Hoyes Rd. South) and Friendsville-Hoyes Rd. that passes over the river and becomes Maple St. in the town center. These bridge areas are also potential spill locations that could cause severe problems. The operator also expressed concern over road salt runoff during the winter from these overpasses. The addition of road salt in the winter is probably a common occurrence on roads around the Friendsville region.

Most of the other main county highways and state routes travel to and from the populated region of Oakland in the southern portion of the watershed. MD Route 135 is a local highway entering Oakland from the east. MD Route 219 is a main road through the source watershed. From Accident, MD the roads heads south and enters the source watershed just north of Deep Creek, then crosses over the lake before heading south to Oakland's town center. U.S. Route 50 (George Washington Highway) is an old east-west travel artery. The route enters the basin in the southeast corner of Cherry Creek, and then continues west in the Upper Youghiogheny subwatershed, where it crosses and runs parallel to both Maple Run and Rhine Creek. MD Route 39 (Hutton-Oakland Rd.), leaves the town of Oakland and eventually turns into WVA Route 7 at the state border



near the village of Hutton. Route 39/7 heads south from Oakland before turning northwest and towards Terra Alta. WVA Route 7 is the only significant road in the West Virginia portion of the basin (See Figure 5 for main roads in the watershed). White Rock Road travels north-south through the western side of the Youghiogheny River Intake subwatershed. It is one of the only roads through this rugged area, and crosses the river near Sang Run. Besides the local crossings in Friendsville, this is the next nearest bridge crossing.

CSX Transportation maintains and operates three Baltimore & Ohio Railroad tracks in the Youghiogheny River watershed. The track runs through the Snowy Creek, Upper Youghiogheny, and Little Youghiogheny subwatersheds. From the west, the track passes by Terra Alta and runs adjacent to Snowy Creek. Near the Village of Hutton, over the state border, the rail line leaves Snowy Creek, and splits with an abandoned track that used to head south to coal mining sites near Crellin. The main rail line travels down the Chisholm Run valley before running adjacent to the Youghiogheny River for approximately 2 miles. The tracks are within 100 yards of the river for a majority of this distance, at a higher elevation. There the line passes in close proximity to the Town of Oakland's drinking water intake (on the Youghiogheny). Below the Oakland intake there is a bridge that spans the river, then the line heads into Oakland. From Oakland, the line follows the main stem of the Little Youghiogheny and leaves the source watershed near the town of Altamont. These tracks are heavily used and have the distinction of being the major rail route between Maryland and points west. Potential contaminants are most likely transported on these tracks and a spill could be a potential problem. However, the distance from the CSX tracks route to the Friendsville intake is far enough that the threat of a spill is not a major concern in this assessment.

### ***Land Use Planning Concerns***

A comparison between the 1990 and 1997 MD DOP land use data sets shows the recent changes in watershed development for the Maryland portion of the source watershed only.

Table 2. 1990-1997 Land Use

Land Use	Percent of Watershed in 1990	Percent of Watershed in 1997
Residential	5.3	7.4
Commercial/Industrial	1.0	1.5
Mining/Extractive	1.0	0.7
Cropland	22.7	21.7
Pasture	5.1	4.9
Forest	61.2	60.0
Open Water	2.8	2.6
Wetlands	0.9	0.9
Agricultural Build-Up	0.1	0.1

Overall, land use change in the Maryland portion of the source watershed was minimal from 1990 to 1997. The percentage of forested land, and land used for agriculture

decreased slightly, while the data shows that residential and commercial/industrial land increased.

The designation of the Youghiogheny River as Maryland's first and only Scenic and Wild River has incorporated land use policies into protecting this resource. The state protected corridor along the river runs from Miller's Run just north of Oakland to the town limit of Friendsville. The corridor is managed by the MD DNR Forest and Park Service to preserve the wild and natural resources of the river. The designation requires that the river must exist in a natural state for at least four miles or have a natural shoreline that is undeveloped and inaccessible except by trail. Land use regulations have been enacted to guide activities in this stretch of the river and MD DNR enforces them. According to the latest available data from DNR, approximately 1750 acres of land in the basin is owned by the state and managed as the Youghiogheny River Scenic and Wild corridor (see Figure 5).

There is other state-owned land in the Friendsville intake watershed. Below is a summary:

Table – 3. State Land

Name	Acres
Deep Creek Lake State Park & Resource Area	1311
Herrington Manor State Park	286
Swallow Falls State Park	232
Garrett State Forest	5210
Youghiogheny River Wild	3313
Mt. Nebo Wildlife Management Area	1810

A total of 12,612 acres (or 6.4%) of land is managed by the state of Maryland in the source watershed area. For the most part, these state managed lands are completely forested and will remain so in the future. The management of the Garrett State Forest will continue, and forest harvests are expected. However, the process for drafting annual work plans (which include harvests) goes through a series of reviews and an on-site inspection by an interdisciplinary team at least a year before implementation. The interdisciplinary team includes a water resource specialist. This process ensures that water quality impacts associated with logging are minimized, or abated altogether. The amount or type of forestry done on private land in the watershed is not clear, but permits for all logging must comply with state regulations and inspections. The forest service is engaged in an ongoing management program of wise land use regulation of private land logging in the main Youghiogheny River corridor.

Land employed for agriculture has not changed in the watershed for some time, and this would not be expected to change. According to the 1997 Census of Agriculture for Maryland, the amount of farmed acres in Garrett County has only slightly increased (<1000) from 1992 to 1997. There has been a decrease in the amount of farms raising livestock (beef and dairy cattle), but a slight increase (<1000) in the amount of animals raised over the same time period. Poultry and hog farms remained constant in the county. Garret County is the largest producer of oats used for grain in the state, but the amount of acres and numbers of farms harvesting this crop have decreased since 1992.



The amount of land classified as "Mining/Extractive" decreased by approximately 435 acres from 1990 to 1997, which may indicate that reclamation efforts are working and the land is reverting back to either forest and/or brush. A 1961 USGS water quality sample had a pH of 4.3 at the Town of Oakland's intake on the Youghiogheny (recent pH values, 1998-1999 at the Oakland intake average 6.8). This condition was most likely attributable to active and abandoned mines in the watershed. Acid mine drainage impacts have been noted on the main stem of the Youghiogheny and in the Deep Creek subwatershed in the 2000 Maryland 305(b) report. WV-DEP stated, in a 1998 assessment, that future proposals for coal mining in the Laurel Run watershed (Snowy Creek) should be scrutinized closely because of the high potential for acid mine drainage (WV-DEP, 1998). The last coal-mining permit in the watershed expired in 1993. Future mining in the watershed, especially near the intake should be discouraged because of past impairments to water quality. Both Maryland and West Virginia receive federal funds to reclaim abandoned mine lands. Reclamation projects in the Youghiogheny watershed could improve water quality and mediate the effects of future acid mine drainage in the watershed.

The small increase in residential land can be attributed to slight growth in the Oakland region and an increase in residences around Deep Creek Lake. There are few zoning laws in Garrett County to prohibit development in the Youghiogheny River watershed. However, properties adjacent to Deep Creek Lake are classified into different residential and commercial zones. The Deep Creek Watershed Zoning Ordinance has had a positive influence on development patterns and controlled residential growth that has occurred in the Deep Creek Watershed over the past twenty-five years (MD DNR, 2000). Management of the lake's shoreline and buffer strip areas has been managed effectively in the past. In the Deep Creek Lake Management Plan, Garrett County is encouraged to utilize its land use authority to direct growth in a manner that has the least possible impact on the water quality of Deep Creek Lake.

Rugged terrain and poor highway access has limited the growth of Friendsville in the past, but a commercial center and 40-acre industrial park is designated in Friendsville's comprehensive town plan. Increased traffic flow at major highway interchanges has stimulated interest in commercial development in the area, especially at Keyzers Ridge, which is located outside of the source watershed. But with increased mobility and access, development near Friendsville may occur.

Development in the Friendsville area is especially important because of its location close to the intake. Future development and planning in this immediate area should take into account the potential effect on water quality in the Youghiogheny River in order to preserve the town's water supply. Storm water management is critical to this process.

## **G. REVIEW OF WATER QUALITY DATA**

Several sources of water quality data were reviewed for Friendsville's source water assessment. These include the MDE Water Supply Program's database for Safe Drinking Water Contaminants and monthly operating reports, MDE TMDL data, MDE bacteriological data, MD Department of Natural Resources CORE monitoring stations,

West Virginia Department of Environmental Protection data, and water quality data from the United States Geological Survey.

### **Monthly Operation Reports**

#### ***Existing Plant Data – Raw Water***

The Garrett County Sanitation District (GCSD) is required to perform water quality tests it produces at the Friendsville water plant. They are required to submit a monthly operating report to MDE's Water Supply program. These reports include some water testing of the river, or "raw water." Turbidity and pH are the parameters tested daily when the plant is operating. Review of the data indicates that the Youghiogheny River is subject to occasional periods of high turbidity, most likely caused by high intensity storms, snow melt, or water releases from the Deep Creek Dam upstream (as expressed by the water plant operator, June 24, 1999). For the April 1997 to May 1998 period of record, the average turbidity of raw water from the river was 8.8 NTU (Median Value = 5.2 NTU), with the highest turbidity, 98 NTU, recorded in November 1997. Over the same time period, the pH of the raw water recorded at the plant averaged 7.1, well within the acceptable drinking water range.

### **Regulated Testing**

The GCSD is required to test for regulated contaminants in its finished water supply from the Friendsville water plant. A large number of these samples are collected by MDE and analyzed by the Maryland Department of Health and Mental Hygiene Laboratory. The data is then reported to MDE's Water Supply Program. Tests for Synthetic Organic Compounds (SOCs), Volatile Organic Compounds (VOCs), and Inorganic Compounds (IOCs) are required on an annual basis. Below are tables of detected compounds only:

#### ***Inorganic Compounds***

IOCs have been annually tested for some time, depending on the contaminant. Most metals and nitrates have been tested regularly since 1977, but in 1993, nitrite and several other metals (such as selenium and thallium) were regulated. MDE's Water Supply Database contains sample results since 1993. Contaminant detections **only** are listed below:

Table - 4. IOCs

<b>Contaminant</b>	<b>MCL</b>	<b>Sample Date</b>	<b>Result</b>
	<b>(mg/L)</b>		<b>(mg/L)</b>
BARIUM	2	18-Apr-95	0.31
BARIUM	2	12-Jun-01	0.02
NITRATE	10	28-Apr-93	0.3
NITRATE	10	14-Dec-93	1.5
NITRATE	10	15-Mar-94	0.64
NITRATE	10	14-Jun-94	0.79
NITRATE	10	13-Sep-94	0.25
NITRATE	10	07-Feb-95	0.6
NITRATE	10	21-Feb-95	0.85



NITRATE	10	15-Aug-95	0.5
NITRATE	10	07-Feb-96	0.5
NITRATE	10	14-May-96	1.47
NITRATE	10	27-Aug-96	0.28
NITRATE	10	02-Apr-97	0.47
NITRATE	10	03-Jun-97	0.5
NITRATE	10	05-May-98	0.6
NITRATE	10	15-Dec-99	0.6
NITRATE	10	26-Jan-00	0.7
NITRATE	10	02-Jan-01	0.3
NITRITE	1	03-Jun-97	0.002
SULFATE	250*	08-May-95	25.3
SULFATE	250*	07-Feb-96	25.9
SULFATE	250*	03-Jun-97	22.5
SULFATE	250*	05-May-98	25.2

\* National Secondary Standard

### **Synthetic Organic Compounds**

Forty-three SOC contaminants have been monitored since 1993. Several pesticides were regulated prior to this, but this data was not available for the assessment. Below is a list of detections only in the Friendsville water supply since 1993:

Table - 5. SOC's

Contaminant	MCL	Sample Date	Result
	(mg/L)		(mg/L)
DALAPON	200	11-May-00	1.88
DI(2-ETHYLHEXYL) ADIPATE	400	07-Feb-96	0.58
DI(2-ETHYLHEXYL) PHTHALATE	6	08-May-95	3.82
DI(2-ETHYLHEXYL) PHTHALATE	6	07-Feb-96	2.87
DI(2-ETHYLHEXYL) PHTHALATE	6	11-May-00	0.8
DI(2-ETHYLHEXYL) PHTHALATE	6	11-May-00	1
PENTACHLOROPHENOL	1	11-May-00	0.09

### **Volatile Organic Compounds**

VOCs were regulated in 1993, and several more were added for monitoring in 1998. There has not been a VOC detection in the Friendsville water supply since testing began in 1993.

However, compounds known as Trihalomethanes (THMs) have been detected. THMs are the result of residual organic matter combining with chlorine during the disinfection process of water treatment. Below are the results from THM detects at the point of entry to the Friendsville water supply. Detections of the same sample are added (in the far right column) because THMs are regulated on a total concentration basis.

Table - 6. VOCs and THMs

Contaminant	Sample Date	Result (mg/L)	TOTAL (mg/L)
CHLOROFORM	07-Feb-96	2.7	2.7
BROMODICHLOROMETHANE	03-Jun-97	0.7	
CHLOROFORM	03-Jun-97	1	1.2
BROMODICHLOROMETHANE	05-May-98	1.2	
CHLOROFORM	05-May-98	27.4	28.6
BROMODICHLOROMETHANE	16-Dec-99	2.9	
CHLOROFORM	16-Dec-99	20.6	23.5
BROMODICHLOROMETHANE	11-May-00	4.1	
CHLOROFORM	11-May-00	29	33.1

### **Source Water Assessment Bacteriological Sampling**

MDE's Water Supply Program initiated a two-year bacteriological monitoring program for all surface water sources in the state to assist in the source water assessment. Sampling began in September 2000 with weekly samples taken from rivers and streams. The Friendsville plant began taking samples in September 2000. This data is summarized in the Susceptibility Analysis section. Below is the data collected through November 2001:

Table - 7. SWAP Bacteriological Sampling

Sample Date	Fecal Coliform (MPN/100ml)	E. Coli (MPN/100ml)
9/7/2000	1400	980.4
9/14/2000	500	1046.2
9/21/2000	170	727
9/29/2000	8000	2419.17
10/5/2000	300	579.4
10/12/2000	9	25.6
10/19/2000	12	93.3
10/26/2000	230	191.8
11/2/2000	59	43.9
11/9/2000	1	19.7
11/16/2000	30	66.9
11/30/2000	300	260.2
12/7/2000	17	11
12/14/2000	30	86
12/20/2000	17	31.3
1/4/2001	14	18.5
1/11/2001	8	10.8
1/18/2001	4	8.6
2/1/2001	900	387.3
2/8/2001	-2	6.3
2/15/2001	30	61.3



2/22/2001	30	34.5
3/1/2001	4	5.2
3/8/2001	23	18.5
3/15/2001	900	365.4
3/22/2001	900	61.6
3/29/2001	23	22.6
4/5/2001	50	71.7
4/12/2001	1600	2419.2
4/19/2001	23	93.4
4/26/2001	23	56.1
5/3/2001	50	77.1
5/10/2001	70	41.9
5/17/2001	90	105
5/24/2001	1600	2419
5/31/2001	30	26.2
6/7/2001	1600	2419.2
6/14/2001	300	137.4
6/21/2001	50	60.9
6/28/2001	900	435.2
7/5/2001	110	156.5
7/12/2001	1600	2419
7/19/2001	1600	2419
7/26/2001	500	770.1
8/2/2001	50	172.3
8/9/2001	170	270
8/16/2001	80	131.3
8/23/2001	500	435.2
8/30/2001	300	248.9
9/6/2001	30	83.6
9/13/2001	500	1119.9
9/20/2001	140	137.4
9/27/2001	110	45.9
11/1/2001	13	44.8
11/8/2001	13	16.1
11/15/2001	13	20.3

#### **MD DNR CORE Sampling Data - Youghiogheny River**

Stations YOU925 and YOU1139 are Department of Natural Resources CORE/Trend sampling sites that are monitored monthly for several water quality parameters. Data from state monitoring stations show elevated bacterial levels in the main stem Youghiogheny River from MD Route 39 to the Youghiogheny River Lake, a distance of 26.6 miles (MD DNR 305b Report, 2000). Low pH levels have been documented at site YOU1139, as well as elevated bacteria concentrations. Station YOU0925 is located approximately 1 mile upstream from the intake. Following is a summary of water quality data for each station collected from 1996 - 2001:

Table – 8. MD DNR CORE Sampling Data - YOU0925

Parameter	Maximum Concentration	Average Concentration
	(mg/L)	(mg/L)
Dissolved Oxygen	7.9 (minimum)	10.4
Nitrate + Nitrite	1.14	0.56
Ammonia	0.11	0.029
pH	7 (minimum)	7.4
Organophosphate	0.05	0.015
Sulfate	52	24.6
Total Organic Carbon	6.18	3.02
Total Phosphorous	0.125	0.033
Total Suspended Solids	74	9.95
Iron	0.7	0.34

Table – 9. MD DNR CORE Sampling Data YOU1139

Parameter	Maximum Concentration	Average Concentration
	(mg/L)	(mg/L)
Dissolved Oxygen	5.2 (minimum)	9.4
Nitrate + Nitrite	1.54	0.73
Ammonia	0.267	0.05
pH	6.3 (minimum)	6.5
Organophosphate	0.052	0.017
Sulfate	51	28.8
Total Organic Carbon	6.7	3.1
Total Phosphorous	0.155	0.044
Total Suspended Solids	80	13.4
Iron	1.4	0.76

Since January 2000, fecal coliform data has also been collected at these two stations. Site YOU1139 has shown higher concentrations overall than YOU0925. A summary table is below, median, mean, and maximum values are in MPN/100ml.

Table – 10. DNR Fecal Bacteria Data

Station	No. of Samples	Median	Mean	Maximum
YOU0925	10	30	657	5000
YOU1139	11	80	1285	13000

### **WVA Ecological Assessment of the Youghiogheny River Watershed – 1996**

The WVDEP Watershed Assessment Program collected water samples for fecal coliform and other physical parameters in support of the ecological assessment of the West Virginia portion of the watershed in 1996. Below is data from that assessment:



Table – 11. WVA Ecological Assessment Data

Station	Location	Date	Fecal Coliform (colonies/100ml)	pH
MY	Youghiogheny River	07/09/1996	2600	na
MY-02	Snowy Creek	07/08/1996	103	7.05
MY-02-A	North Branch Snowy Creek	07/08/1996	42	8.13
MY-02-A-1	Wardwell Run	07/08/1996	136	7.08
MY-02-B	South Branch Snowy Creek	07/09/1996	1000	7.27
MY-02-B-1	Pine Run	07/09/1996	600	7.94
MY-03	Laurel Run	07/09/1996	0	3.47
MY-03-A	Little Laurel Run	07/09/1996	200	7.45
MY-04	Rhine Creek	07/09/1996	5500	7.74
MY-05	Maple Run	07/09/1996	3200	7.49

Refer to Figure 4 in the Appendix for the map location of these sample sites.

#### **United States Geological Survey – Water Quality Data**

The USGS has (and continues to) collect water quality data at various stations across the state of Maryland. Water quality samples collected in the Youghiogheny River basin were identified using a map of historical sampling stations, and data was downloaded from the USGS web site. This data is limited and was collected by the USGS for the most part between 1979 and 1985. However, it is the only known data for some of the major tributaries of the Youghiogheny, and when appropriate, can be used to compare historical and recent water quality data. The data has been summarized below. Please refer to Figure 4 in the appendix for a map location of these historical stations.

Table – 12. USGS Water Quality

<b>USGS 030776500 - Youghiogheny River at Friendsville</b>			
Parameter	Samples	Mean	Maximum
		(mg/L)	(mg/L)
pH	24	6.8	6 (minimum)
Nitrate+Nitrite	14	0.525	0.8
Sulfate	24	17	31
Fluoride	24	0.1	0.1
Iron	24	1.1	16
Manganese	24	0.12	0.58

<b>USGS 3075550 - Herrington Run at Herrington Manor</b>			
Parameter	Samples	Mean	Maximum
		(mg/L)	(mg/L)
pH	5	4.9	4.2 (minimum)
Sulfate	5	7.7	8.6
Iron	5	0.502	0.78

Manganese	5	0.11	0.14

**USGS 03075700 - Muddy Creek at Swallow Falls State Park**

Parameter	Samples	Mean (mg/L)	Maximum (mg/L)
pH	3	6.6	6.5 (minimum)
Nitrate+Nitrite	2	0.4	0.44
Iron	3	0.356	0.59
Manganese	3	0.05	0.06

**USGS 03075495 - Little Youghiogeny at 3rd St. in Oakland**

Parameter	Samples	Mean (mg/L)	Maximum (mg/L)
pH	6	6.2	5.2 (minimum)
Iron	6	1.12	1.9
Manganese	6	0.153	0.34
Sulfate	6	10.8	12

**USGS 03076010 - Deep Creek at Dam outflow**

Parameter	Samples	Mean (mg/L)	Maximum (mg/L)
pH	3	6.2	5.9 (minimum)
Iron	3	0.396	0.68
Manganese	3	0.14	0.16

**03075340 - Youghiogeny River near Crellin MD**

Parameter	Samples	Mean (mg/L)	Maximum (mg/L)
pH	9	6.4	5.6 (minimum)
Nitrate+Nitrite	1	0.89	na
Iron	9	0.674	0.98
Manganese	9	0.052	0.07



## H. SUSCEPTIBILITY ANALYSIS

Each class of contaminants that were detected in the water quality data will be analyzed based on the potential they have of contaminating Friendsville's Youghiogheny River intake. This analysis will identify suspected sources of contaminants, evaluate the natural conditions in the watershed that may increase or decrease the likelihood of a contaminant reaching the intake, and evaluate the impacts that future changes may have on the susceptibility of the intake.

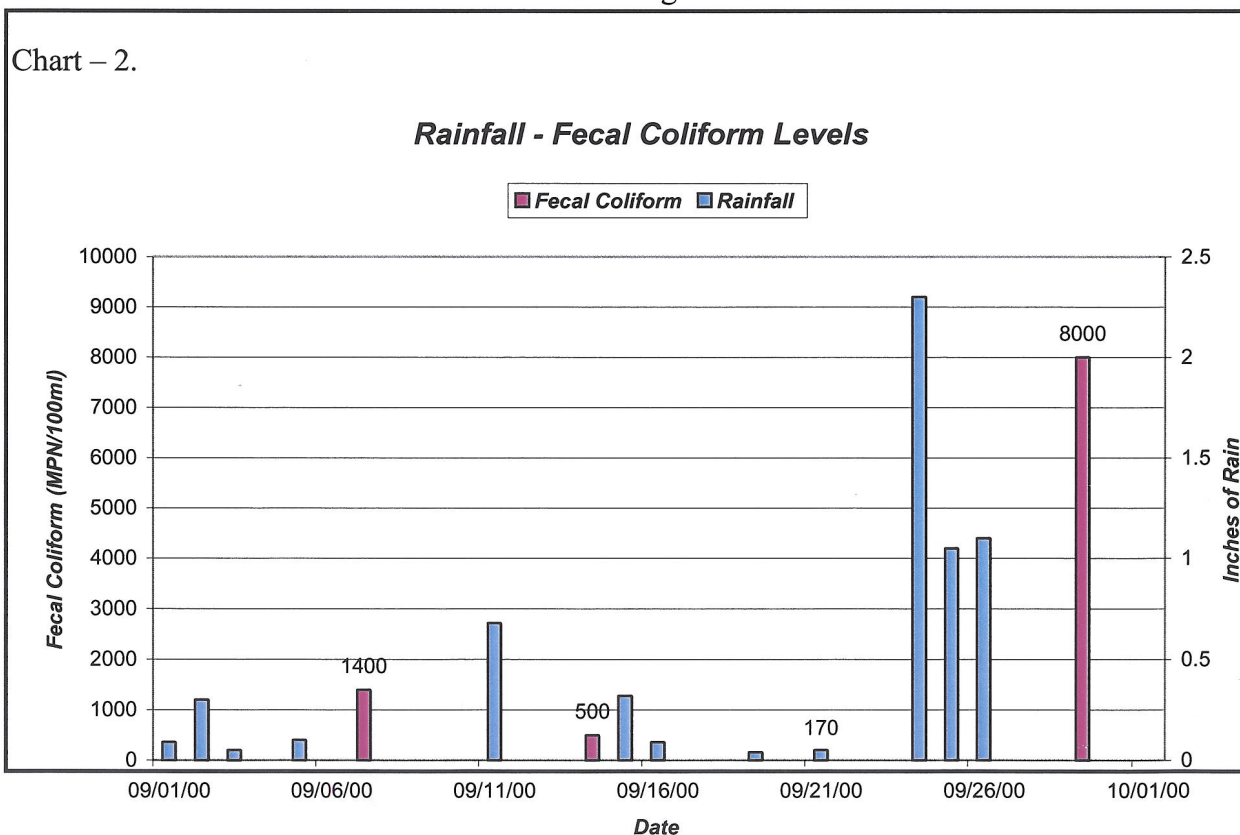
### Microbial Contaminants

Under current regulations, the GCSD water plant is required to take 1 total coliform sample a month from the finished drinking water at the Friendsville Water Plant. These bacteriological samples are collected at points in the distribution system. It would be difficult to use this data for the assessment because it does not adequately give an indication of contamination in both raw water supplies. Because of this lack of data, raw water bacteriological monitoring began in September 2000 at the plant. Below is a statistical summary of the data tabled previously in the WATER QUALITY REVIEW.

Table - 13. Summary of Bacteria Data

Source	No. of Samples	Fecal Coliform			E. Coli		
		Mean	Median	Maximum	Mean	Median	Maximum
Youghiogheny River	56	465	65	8000	436	90	2419

Mean concentrations are relatively high, and most likely reflect randomly high concentrations that are due to increased runoff during storms. See the chart below:



Rainfall data was taken was provided by the Maryland Climatological Office in College park. The data is from a recording station in Oakland. It is apparent that a few days after a substantial rain in the Oakland area, the fecal bacteria concentrations in the river at Friendsville increased.

Streams which receive non-point source water runoff from pastures and concentrated livestock areas can have high concentrations of bacteria associated with eroding soil during periods of high flow. These bacteria can remain viable for long periods of time and attach to soil particles. During a storm, erosion of land surfaces may increase and previously eroded sediment in the streambed can be resuspended, leading to increased bacteria concentrations. Continuous point loading of bacteria from wastewater plant discharges can contribute to elevated concentrations at intake sites when combined with upstream sources during/after storms. Bacteria that are discharged in effluent and have settled can also become resuspended.

The only bacteriological data available from West Virginia were samples taken by the WVA-DEP in 1996 as part of the Youghiogheny River watershed assessment. This data is listed in the Table 11. Counts ranged from 0 MPN/100ml in Laurel Run, to 5500 MPN/100ml in Rhine Creek. Unfortunately this study only sampled each site once, but it did give clues to the suspected sources of elevated bacteria levels, which are discussed below. This data shows that bacteria sources are fairly common throughout the entire watershed and not entirely particular to one stream, subwatershed, or state.

Elevated bacteria concentrations have been documented in the main stem Youghiogheny River and the Little Youghiogheny River in Maryland's Section 305(b) Report (see Table 10). Excessive concentrations were attributed to non-point source runoff from urban and agricultural land from numerous tributaries in the lower reaches. In general, potential non-point sources of pathogenic protozoa, viruses, and bacteria in Friendsville's source water areas include pasture (livestock), residential septic systems, and wildlife. In the WVDEP assessment several sources of contamination were identified. Dairy farm operations, cattle having direct access to streams, and residences without appropriate operating septic systems were listed as potential sources in Rhine Creek and Maple Run, in the WVA portion of the Upper Youghiogheny subwatershed. According to the Youghiogheny River watershed assessment many valleys in West Virginia supported cattle farms (WV-DEP, 1998). In Maryland, the southern basin contains the most agricultural, residential, and urban land. Bacteriological contamination sources exist in the Pleasant Valley region, Cherry Creek valley, and the Oakland area.

The seven wastewater plants in the Youghiogheny River source watershed also contribute to bacteria loading. The two plants in West Virginia, Terra Alta and Alpine Lake, were both identified as having infiltration/inflow problems, and in the past Terra Alta has discharged incompletely treated sewage directly into Snowy Creek. However, these small plants are located a considerable distance from the intake and dilution in the river probably mitigates there bacteria loading concentrations. Most of the plants within Maryland are relatively small with low discharge flows. Swallow Falls State Park is the second closest WWTP to the intake, but it probably has a negligible effect due to its limited discharge in winter months and low flow. The Town of Crellin WWTP contributes to bacteria loading in the river, but the operator of the Oakland Water Treatment Plant,



located just downstream of the discharge had not experienced any problems with excessive bacteria attributed to the WWTP. This plant has a high dilution factor and has not been cited for exceeding its permit in the past. The Oakland, Trout Run, and Deep Creek WWTPs are the three largest in the Maryland portion of the watershed. Deep Creek WWTP is the closest plant to the intake, but is still at least 15 river miles upstream. Deer Creek is the fastest growing area in the subwatershed and plans are already underway to build another WWTP in the area, but upgrading the Deer Creek Plant and increasing its discharge flow may be a future option. The plant has a lower permitted flow than the Oakland and Trout Run plant, but for the past three years the actual Deer Creek average discharge flow has been greater than the Oakland and Trout Run plants.

The construction of the Oakland Plant has improved the water quality in the southern basin of the Youghiogheny, by collecting and treating wastewater, instead of past circumstances where raw sewage from the town was discharged directly into the river. Trout Run's discharge is limited because of conditions in the Little Youghiogheny River, to prevent water quality degradation when the river is most susceptible (during low flow). These plant discharges are within approximately 3.7 miles of each other, and the combined flow from the plants averages 0.73 MGD. Bacteria loading from the WWTPs in the watershed may not, as individual plants, cause serious water quality problems in the river, but their total contribution ( 1.3 MGD of sewage effluent flow from Maryland plants, depending upon season) when combined with non-point sources, make them a bacteriological contamination source in the Friendsville source watershed.

The GCSD has never tested for species of *Giardia* or *Cryptosporidium* in the Friendsville water supply. Both of these microscopic protozoa are believed to be fairly common in surface waters of the United States. High turbidity and elevated bacteria concentrations can be an indicator for the presence of these pathogens. Sources of contamination include human and animal waste, including birds. Water filtration does not always provide a 100% effective barrier; especially against the smaller *Cryptosporidium* oocysts.

At this time the Youghiogheny River intake is susceptible to contamination by pathogenic bacteria, protozoa, and viruses. There are numerous point and non-point sources of these contaminants within the watershed. Bacteriological concentrations are high enough to cause concern, and levels are most likely problematic during increased river flow due to storms/snowmelt.

### **Turbidity and Sediment**

Excessively high turbidity can interfere with water treatment and can carry harmful microorganisms and compounds into drinking water supplies. Turbidity is used as a surrogate indicator for the presence of *Cryptosporidium* and *Giardia*, and increased water turbidity is indicative of elevated bacteria concentrations. Turbidity is caused by erosion of materials from the contributing watershed. Turbidity may be from a wide variety of materials, including soil particles and organic matter created by the decay of vegetation. During storm events and/or snowmelts, surface runoff increases. Runoff during a storm event occurs when the rate of precipitation exceeds the rate of infiltration. As runoff increases during a storm and/or snowmelt, the increased flow of water can cause soil and other material to erode, raising the turbidity. In addition to turbidity increases due to natural events, electricity generation at the Deep Creek Hydroelectric Dam can quickly



increase the flow of the river. According to the water plant operator, water release from the dam/generating station has an effect on the turbidity of the river at the water plant. Major swings in raw water turbidity can be attributed to this operation. Runoff from Friendsville enters the river above the intake; this storm water is likely at times to have a higher turbidity and sediment content than ambient river water. Also, permitted runoff from the NPDES discharge sites in the basin, which include storm water, most likely increase turbidity in the river.

With 68% of the watershed forested, sediment loads to the river are expected to be moderate, but increased flow due to storms or water release can generate much higher sediment loads. Review of plant records and discussion with the water superintendent indicate that periodic increases of turbidity in the river have been and continue to be a common occurrence. The WVA-DEP noted that many sample sites in the West Virginia portion of the Youghiogheny River watershed had moderate to high levels of in-stream sedimentation, which they attributed to a combination of low stream gradients and soil erosion from farms and residential areas (WVA-DEP, 1998). These conditions are typical of the southern basin below Oakland, and including the Little Youghiogheny subwatershed. As noted in the watershed characterization, hydrologic conditions north of Mill Run and the Oakland region change dramatically, the slope of the main river increases, the river becomes erosional instead of depositional, and the river valley and tributaries are heavily forested.

Monthly total suspended solid (TSS) samples from the DNR sample site (YOU0925) just upstream of the intake averaged 9.9 mg/l from 1996 - 2001. Below is a comparison of suspended solids data from similar rivers in the same geographic region from 1991 - 1996:

Table 14 – Suspended Solids Data

Sample Site	Average TSS (mg/l)	Maximum TSS (mg/l)
Savage River	6	22
Casselman River	6.77	46
North Branch Potomac	17.2	158
Little Youghiogheny River	18.4	318
Youghiogheny River (YOU1139)	11.5	80
<b>Youghiogheny River (YOU0925)</b>	<b>9.1</b>	<b>82</b>

Total suspended solids data near the river intake is comparable to other western Maryland river sample stations. Watershed contributions of sediment and other suspended particles which contribute to turbidity do not appear unique, or overly exaggerated, in the Youghiogheny River when compared to other similar hydrological and geographically located stations outside of and within the same major watershed. However, average values of total suspended solids at both sample stations, YOU1139 and YOU0925, have slightly increased from the time period of 1991-1996 to 1996-2001. Station YOU1139 increased by an average of 2 mg/L, and YOU0925 increased 0.8 mg/L between the two time periods (see Tables 8 & 9).



Future land use changes in both watersheds could increase the potential of turbidity contamination in the Youghiogheny River. Alteration to forested land could increase the amount of exposed surfaces that can lead to increased runoff and erosion. There has been some residential development in the source watershed, though relatively small, and agricultural land use has remained fairly constant and would not be expected to change in the near future. Recovery of mineral and forest resources could potentially increase runoff and raise the potential for problematic turbidity events in Youghiogheny River watershed.

## **Inorganic Compounds**

### **Nutrients**

The Friendsville Plant has had 17 nitrate detections from 1993-2001. These concentrations have ranged from 0.002 to 1.5 mg/l, and have a mean detection concentration of 0.6 mg/l. These values are well below the MCL of 10.0 mg/l. Nutrient data from the DNR stations showed that concentrations of nitrate(+nitrite) were below the MCL, at an average concentration of 0.56 mg/l near the intake (YOU0925) and a little higher upstream, 0.73 mg/l at YOU1139.

Sources of nitrates in the Youghiogheny River watershed include the 46,000 acres of agricultural land (crops and pasture), residential septic systems, wastewater treatment discharge, atmospheric deposition, and wildlife. Cherry Creek, in the Upper Youghiogheny subwatershed, and the Little Youghiogheny River are likely major sources of nutrients to the Youghiogheny River. Over half of Cherry Creek's watershed is used for agriculture (5700 acres of cropland, 580 acres of pasture – MOP 1997 Land Use Data). The EPA took nitrate samples near the mouth of Cherry Creek in 1986. These concentrations ranged from 3.31 mg/l to 4.48 mg/l, the highest levels seen in the data reviewed by MDE (STORET DATA), but still less than half of the regulated MCL. USGS data from 1979-1980 showed that concentrations of nitrates (and nitrite) in several major tributaries were below the nitrate MCL. These values are not significantly different from more recent data collected at the DNR sampling stations, indicating that little change has taken place in nitrate loading in the watershed.

Increased residential development and wastewater discharges could increase the potential of nitrate contamination. Agricultural land would not be expected to change much in the near future. Garrett County's agricultural census showed little change in the number of farms and the amount of land farmed from the 1990 to 1997 census. At this time the Youghiogheny River intake is not susceptible to nitrate contamination.

The Friendsville water system received a waiver for nitrite testing after sampling results 1997 indicated that nitrite in the finished water supply was below (at least half of) the MCL of 1.0 mg/l. See Table 4 for nitrite data. Nitrite and nitrate have the same potential sources of contamination. Nitrite is not a threat to contaminate the Youghiogheny River intake, and is not considered a threat to the water supply.

Nutrient data from the two DNR stations (Total Phosphorous, ammonia, organophosphate), do not indicate any water quality problems. While some of these elements and compound species are not regulated for drinking water, they can contribute



to nutrient over-enrichment (contamination) related problems, such as algae blooms, taste and odor problems, and increased THM precursors. At this time the intake is not susceptible to problems associated with excessive nutrients.

### **Trace Metals**

Regulated heavy metals are tested annually in the finished water produced at Friendsville's water treatment plant, and since the early 1993 there have only been 2 detections. Barium, a relatively common heavy metal was detected twice, once in 1995 and again in 2001. Both of these detections were significantly lower than the MCL and 50% trigger. Barium is most likely to be naturally occurring and does not pose a risk to the water source.

Laurel Run, which has been impacted by acid mine drainage, had elevated levels of aluminum, iron, and manganese in a 1996 sample included in the Youghiogheny River watershed assessment (WVA-DEP, 1998). The concentrations of iron (21 mg/l), manganese (1.5 mg/l), and aluminum (8.9 mg/l), were significantly higher than the national secondary drinking water regulations (non-enforceable guidelines that regulate contaminants that may cause cosmetic effects). Because of abandoned mine drainage found in Laurel Run, other trace metals may be present in the ambient water and/or sediment. Other streams impacted by acid mine drainage, such as White Rock Run and Cherry Creek near Deep Creek Lake, may have similar water quality conditions as Laurel Run. If present in the upper watershed, heavy metals are not making it downstream to the intake in significant concentrations. Heavy metal contamination due to mining impacts in the Youghiogheny are not likely to threaten the Friendsville intake at this time, but more water quality testing and reclamation of abandoned mine land may still be needed.

Iron samples from both DNR sampling stations and older data from the USGS show that concentrations of iron in the water commonly exceed the secondary drinking water standard of 0.3 mg/l. The USGS data also showed that average manganese concentrations exceeded the national secondary standard (0.05 mg/l) at six of seven sampling sites throughout the entire watershed. Iron and manganese are a common elements in western Maryland waters, and high concentrations can be associated with aesthetic and nuisance effects such as taste and odor problems and fixture staining, but they are not necessarily public health concerns.

### **Sulfate**

Sulfate is not a regulated drinking water contaminant, but the NSDWR secondary standard concentration is 250 mg/L. Average sulfate concentrations from the Friendsville Plant (finished water), DNR sample stations, and older USGS are all well below the secondary standard. According to the USGS, Sulfate can be good indicator of mining activity and acid or alkaline mine drainage, or AMD (USGS Circular 1202, 2000). According to the Allegany and Monongahela NAWQA study, regional background concentrations of sulfate from non-impacted streams was 20.8 mg/L. Average sulfate data from the water plant and the two DNR sites were slightly higher than this background level, and data from the two DNR sites (YOU0925 and YOU1139) sometimes doubled the background concentration. High concentrations of sulfate may be an indicator of acid mine drainage impacts in the Youghiogheny, even though other indicators, such as heavy metals and pH, do not reflect a problem at the intake. AMD



impacts may be greater during storm events that cause increased runoff from abandoned mines.

### **Radionuclides**

Radionuclides have not been detected in the Friendsville water supply. Gross Alpha and Beta are tested once every four years at the water plants. No anthropogenic and/or significant natural sources are present in the Friendsville source watershed.

### **Other Inorganic Compounds**

No sources of cyanide, asbestos, or fluoride were found within the source watershed. Fluoride samples from plant data are well below the primary drinking water standard of 2 mg/l. Data from the USGS also showed background levels of fluoride near the intake. Fluoride found in the raw water supply is most likely from natural deposits. The intake is not susceptible to these contaminants.

### **Volatile Organic Compounds**

Friendsville is required to test finished drinking water for the presence of volatile organic compounds. Since 1990, there have not been any detections of VOCs in the water supply. Sources of VOC contamination within the watershed would include runoff from urban/residential land, and discharge from several of the permitted NPDES sites, especially the Peters Fuel Company, Fairfax Concrete products, and the Deep Creek Hydroelectric Generating Station. However, the lack of any detections since 1990 and the absence of any significant potential sources close to the intake make the Youghiogheny River not susceptible to regular VOC contamination at this time. The only significant threat of potential VOC contamination would come from a spill. The threat of a potential spill is covered under the *Transportation Related Concerns* above. A hazardous spill in the Friendsville area, along one of the major road crossings, could have a serious and relatively quick impact on the Youghiogheny River water supply.

Trihalomethanes (THMs) result from the reaction of naturally occurring organic matter with chlorine during the water treatment process. Currently, the EPA sets a MCL of 100µg/l (ppb) for Total THMs, but this level is scheduled to change in 2003. The new MCL for systems serving 10,000 persons or less is 80µg/l (ppb) starting in 2003. This rule will apply to the Town of Friendsville. Past THM samples were taken at the point of entry (water plant) to the water distribution system. The new MCL requires samples to be taken in the distribution system, so accurate comparisons of the old data and the new MCL cannot be made. In fact, concentrations may be higher in the distribution system because of longer contact time. The most common THMs detected at the Friendsville water plant are chloroform and bromodichloromethane. The average Total THM concentration at the Friendsville plant, 17.8 mg/l, is less than 50% of the current MCL.

Under the new THM regulations, Friendsville will be required to monitor its distribution system for compliance with the Total THMs standard. Results of this testing will determine the need for further evaluation of the THM contamination.

### **Synthetic Organic Compounds**

Friendsville has had seven SOC detections since 1993. All of these detections were significantly lower than the MCL regulation and 50% trigger for each contaminant. The most common compound found, Di(ethylhexyl)phthalate (DEHP) is a resin commonly found in plastics. Its prevalence in plastics makes it a hard substance to sample and test. Because this compound appeared in all laboratory blanks when detected, the reported quantities are not likely reflective of levels in the environment, but rather laboratory artifacts. Dalapon, detected once in May 2000, is a herbicide commonly used on right-of-ways and transportation corridors. The only other compounds detected in the finished drinking water were Di(2-ethylhexyl) Adipate and Pentachlorophenol. Di(2-ethylhexyl) Adipate, detected once, is similar to DEHP and was found in the laboratory blank as well. Pentachlorophenol is used as an "restricted" wood preservative (fungicide) according to the Environmental Protection Agency. Other uses of the chemical (as a herbicide) were banned in 1987. The compound can be released from utility poles, fence posts, and any other treated wood. Once released into water pentachlorophenol can attach to sediment particles and last several weeks. However, there has been only one detection in 11 years, and that was well below 50% of the MCL. At this time the Town of Friendsville's intakes is not susceptible to regular SOC contamination.



## **I. RECOMMENDATIONS FOR SOURCE WATER PROTECTION PLAN**

With the information contained in this report, the GCSD and the Town of Friendsville hopefully have a new understanding of how to protect their water supply. Most of the area delineated for source water protection (watershed) is not under the control of the GCSD or the Town of Friendsville. However, source water protection strategies that could be implemented to preserve water quality include: working with the Department of Natural Resources in preserving and increasing land in the Youghiogheny River Scenic and Wild Corridor, working with Garrett County and Friendsville to make changes in storm water management within the Town's limits, keep track of potential contaminant sources old and new, and evaluate future development and land use planning. A source water protection plan for the Youghiogheny River intake is the underlying goal of this assessment. Specific management recommendations for consideration are listed below:

### **Form a Local Watershed Planning Team**

- In order to protect the interests of the town's water supply, a watershed group should be formed. Besides officials from the town and the GCSD, the Youghiogheny Watershed group should include officials from Preston County, WVA, local WVA and MD soil conservation district officers, Garrett County Department of Planning, Town of Oakland officials, an official from Reliant Energy Holdings, LLC., appropriate personnel from the West Virginia Department of Environmental Protection, and MDE.
- Goals of this group should include: increased citizen involvement in protecting the watersheds, a tool for keeping up to date on changes in the watershed, and to promote watershed protection and possibly recreational opportunities.

### **Public Awareness and Outreach**

- Future Consumer Confidence Reports need to provide a summary of this report and indicate that the entire report is available to the general public through their library, contacting the town office, or by contacting the Water Supply Program at MDE.
- Road signs explaining to the public that they are entering a protected drinking watershed is an effective way of keeping the relationship of land use and water quality in the public eye, and help in the event of a spill notification and response.
- In order to facilitate the notification of potentially damaging spills, signs should be erected on Interstate 68, and the two other bridge crossings within the town limits.
- Discuss with officials of CSX Transportation the occurrence, notification, and mitigation of potential spills along the Youghiogheny River.
- Work with the Maryland Bureau of Mines on reclamation projects of abandoned mine land.
- Include interested members of the public on the watershed planning team.

### **Monitoring**

- Continue to monitor for fecal coliform and/or E. coli in the river after the two-year MDE sponsored monitoring program is over.
- Continue to monitor for all Safe Drinking Water Act contaminants as required by MDE, including raw reservoir sampling when feasible.

- Meet with officials from the Deep Creek Hydroelectric Generating Station to discuss water releases and notification (for the plant operator).
- Discuss with MDE's TMDL Program future monitoring related to the TMDL and Maryland's Watershed Cycling Strategy.

#### **Land Acquisition and Easements**

- The availability of loans for purchase of land or easements for the purpose of protecting water supplies is available from MDE. Loans are offered at zero percent interest and zero points.
- Work with the MD Department of Natural Resources and the Garrett County Department of Planning in securing and managing state lands associated with the Youghiogheny Scenic and Wild River corridor.
- Work with local soil conservation districts to implement best management practices for manure management, stream fencing and other riparian protection measures.
- Work with the MD Department of Agriculture to promote agricultural preservation districts and easements through the Maryland Land Agricultural Preservation Fund in the southern region of the Youghiogheny basin, with the local Soil Conservation Service and local farmers.

#### **Contaminant Source Inventory Updates**

- The Town of Friendsville and the GCSD, and/or the new watershed group, should periodically conduct detailed field surveys of each subwatershed to ensure there are no new potential sources of contamination.
- Update MDE on potential land use changes that may increase the susceptibility of the river to contaminants.
- Determine if Alpine Lake and Terra Alta (WWTPs) have fixed the infiltration/inflow problems at the sewage treatment plants in the Snowy Creek subwatershed.
- Public watchdog: Monitor MDE compliance reports for point dischargers (NPDES) in the watershed, and become part of the permit renewal process.



## REFERENCES

- Anderson, Robert. M, et al., 2000. Water Quality in the Allegheny and Monongahela River Basins, Pennsylvania, West Virginia, New York, and Maryland, 1996-98. United States Geological Survey - Circular 1202, p32.
- Garrett County, 1997. Garrett County Water & Sewer Plan 1997 Update. Garrett County Department of Planning, 72p. plus appendices and maps.
- MD Department of the Environment, 1998. Comprehensive Performance Evaluation of the Town of Friendsville Water Treatment Plant, Friendsville – Garrett County, Maryland. Water Supply Program, 33p.
- MD Department of the Environment, 1999. Maryland's Source Water Assessment Plan. Water Supply Program, 36p.
- MD Department of the Environment, 1999. Total Maximum Daily Loads of Phosphorous to Broadford Lake, Garrett County, MD. Technical and Regulatory Services Administration, 16p.
- MD Department of the Environment, 2000. Total Maximum Daily Loads of CBOD and NBOD for the Little Youghiogheny River. Technical and Regulatory Services Administration, 28p.
- MD Department of Natural Resources, 2000. 2000 Maryland Section 305(b) Water Quality Report. Resource Assessment Service, 244p.
- US Department of Agriculture, 1999. 1997 Census of Agriculture, Maryland State and County Data. National Agricultural Statistics Service, 367p.
- MD Department of Geology, Mines, and Water Resources State of Maryland, 1954. Geology and Water Resources of Garrett County, 339p.
- West Virginia Department of Environmental Protection, 1998. An Ecological Assessment of the Youghiogheny River Watershed within West Virginia – 1996. Watershed Assessment Program, 55p.

## OTHER SOURCES OF INFORMATION

- MDE Water Supply Inspection Reports
- MDE Water Supply reader file for the Town of Friendsville (PDWIS ID 0110008)
- MDE Water Supply Program Oracle Database (PDWIS)
- Town of Friendsville Monthly Operating Reports (MORs) and Self-Monitoring Reports

- MD Department of Natural Resources Digital Orthophoto Quads for Garrett County
- Digital USGS Topographic 7.5 Minute Quadrangles, SureMaps Raster.
- Maryland Office of Planning 1997 and 1990 Garrett County Land Use data
- Maryland Office of Planning 1999 Property View Tax Map, Garrett County.
- Water Quality data from EPA's STORET database clearinghouse
- MD DNR Resource Assessment water quality data
- WVA spatial data from West Virginia Department of Environmental Protection
- EPA Chemical Fact Sheets, <http://www.epa.gov/safewater/mcl.html>
- MD Bureau of Mines, Abandoned Mine Land Report and associated data



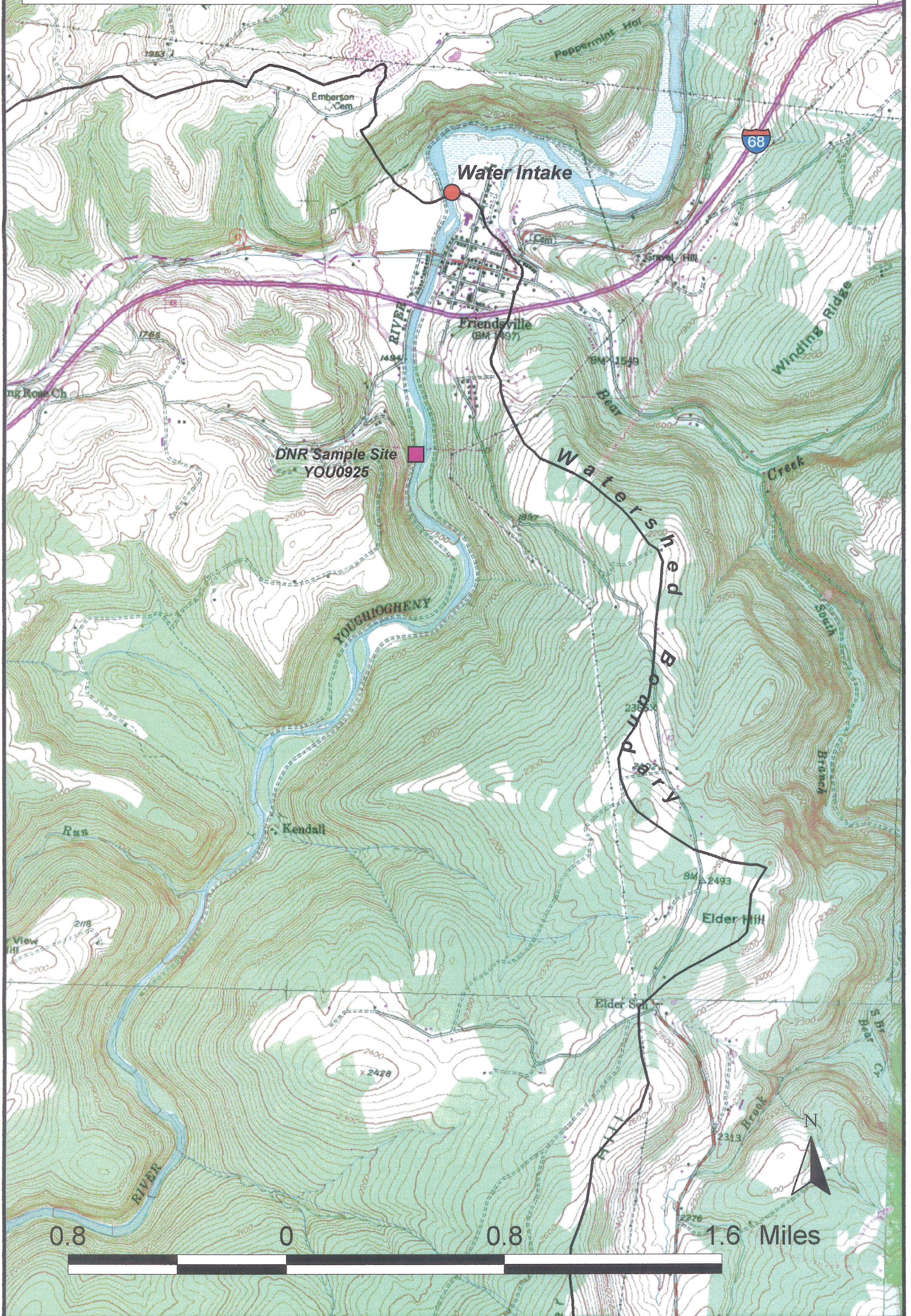
## **APPENDIX**

### **Figures**

- Figure 1. Topography and Local Area near Town of Friendsville's Intake
- Figure 2. MRLC Land Use View
- Figure 3. Municipal WWTPs & Industrial NPDES
- Figure 4. Water Quality Sampling Sites
- Figure 5. Main Roads & State Lands
- Figure 6. Digital Ortho Quarter Quad (Aerial Photograph) of Friendsville

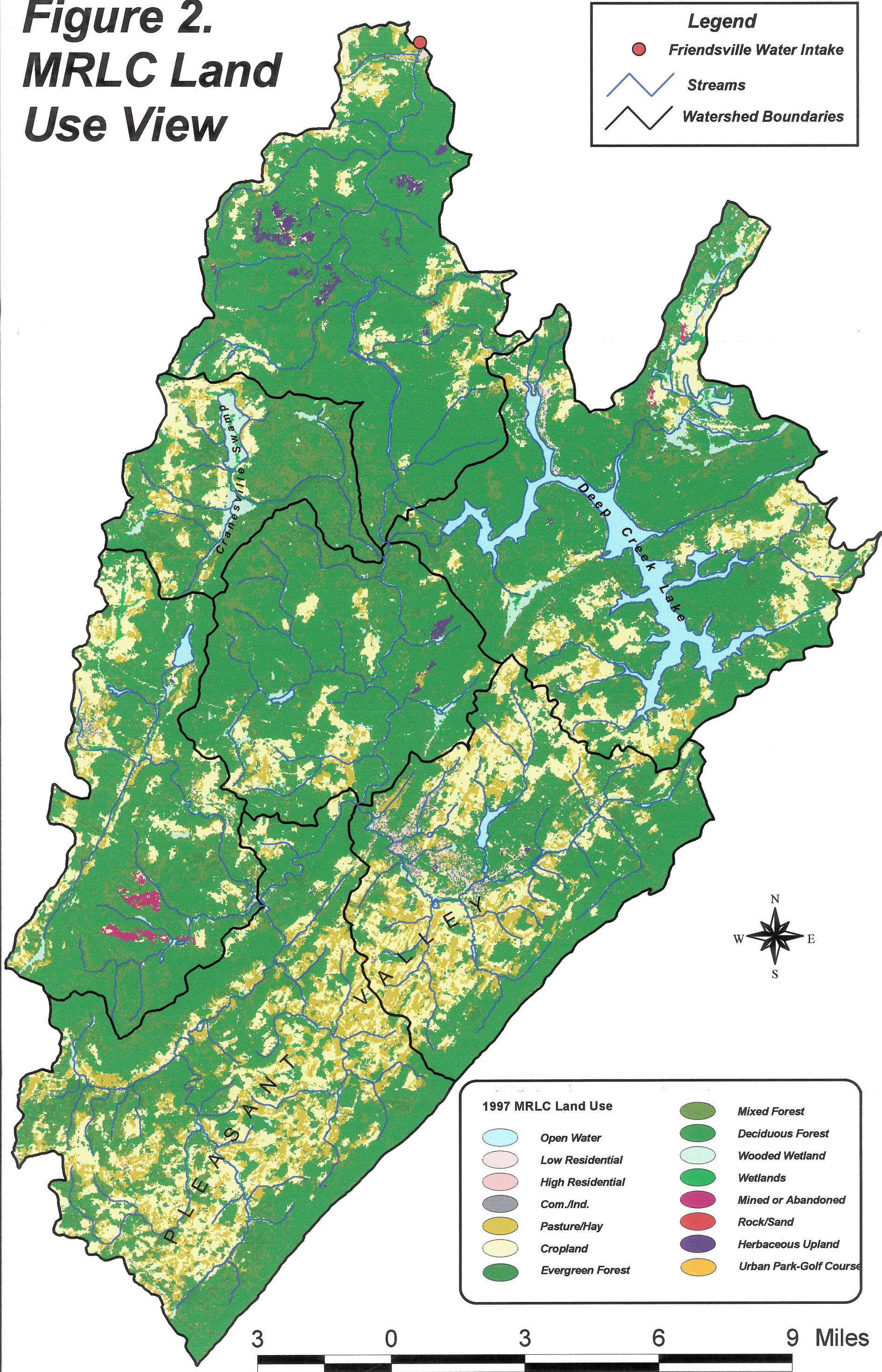


**Figure 1. Topography and Local Area near the Town of Friendsville's intake**





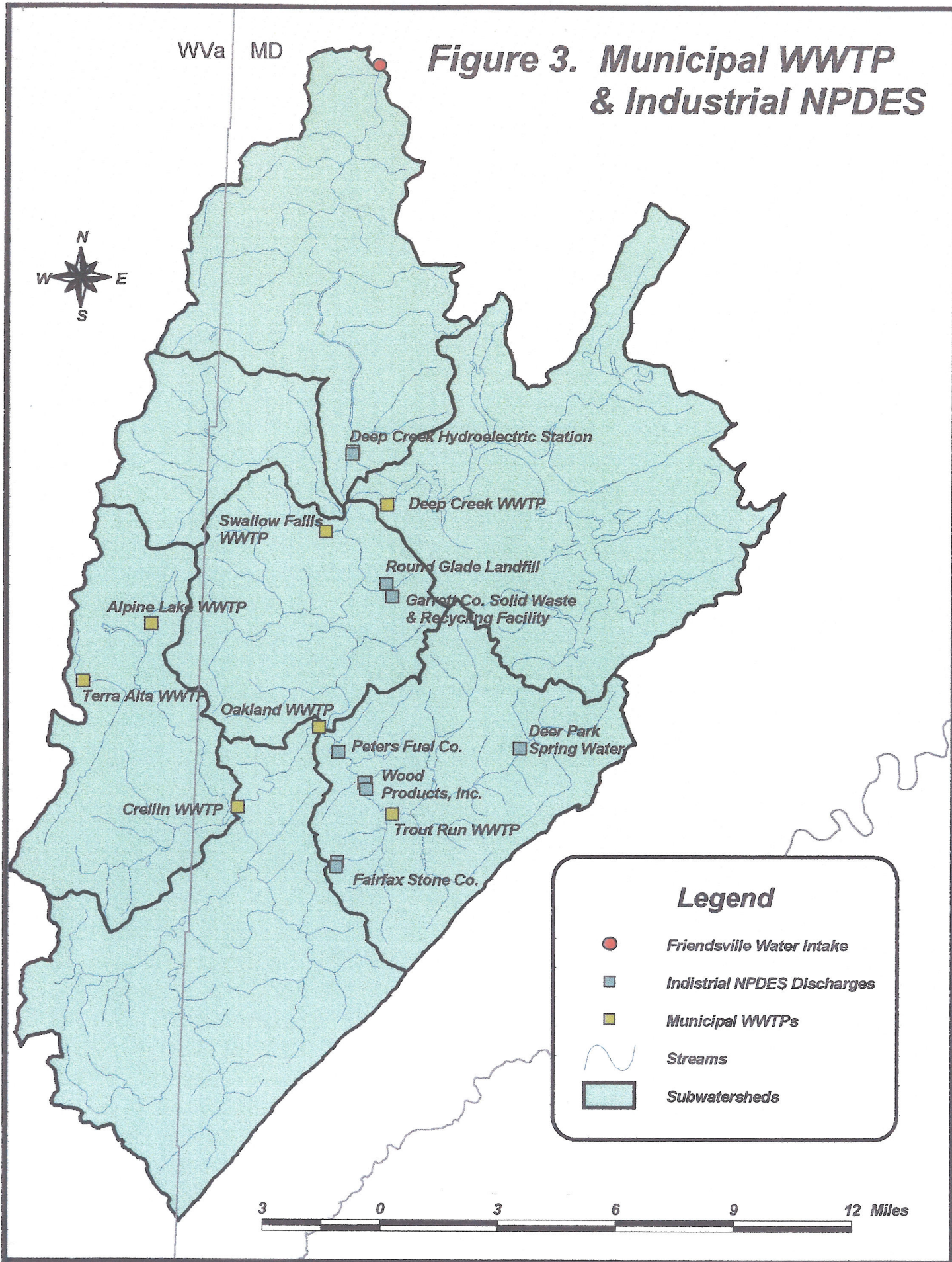
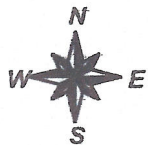
**Figure 2.**  
**MRLC Land**  
**Use View**





WVa MD

**Figure 3. Municipal WWTP & Industrial NPDES**





# Figure 4. Water Quality Sampling Sites

