



S.S. Papadopoulos & Associates, Inc.
Environmental and Water Resource Consultants



Source Water Protection Plan for Myersville Maryland

May, 2013

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and

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Source Water Protection Plan for Myersville, Maryland

Prepared for:
Maryland Department of the Environment
Water Supply Program
(Purchase Order # P2400301)

Prepared by:



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May, 2013

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ENVIRONMENTAL & WATER-RESOURCE CONSULTANTS

May 14, 2013

Kristin B. Aleshire
Town Manager
301 Main Street, P.O. Box 295
Myersville, MD 21773

Subject: Source Water Protection Plan for the Town of Myersville

Dear Kristin:

I am pleased to be sending the attached Source Water Protection Plan for the Town of Myersville. S.S. Papadopoulos & Associates and Chesapeake Environmental Management have developed this plan based upon the Scope of Work provided to us by MDE's Water Supply Program (WSP), our discussions with Town staff, and comments on the draft report provided by the Town of Myersville and WSP.

We will be sending you several hard copies of the report via the US mail; you should receive them shortly.

It has been a pleasure working with you in developing this report, and I hope that it helps Myersville in maintaining a safe and secure supply of drinking water into the future. If you have any questions about this report, or need any additional assistance in the future, please do not hesitate to contact me.

Sincerely,

S. S. PAPADOPULOS & ASSOCIATES, INC.

Harvey Cohen, PhD, PG
Associate

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List of Acronyms

1,2-DCA	1,2-Dichloroethane
AGPD	Average Gallons per Day
CEM	Chesapeake Environmental Management
DBR	Disinfection Byproducts Rule
DEM	Digital Elevation Model
ESD	Environmental Site Design
GHS	Generators of Hazardous Waste
GIS	Geographic Information Systems
GPD	Gallons per day
GPY	Gallons per year
GUDI	Groundwater Under Direct Influence of Surface Water
IOC	Inorganic Compounds
MCL	Maximum Contaminant Levels
MDE	Maryland Department of the Environment
MGPD	Maximum Gallons per Day
MSL	Mean Sea Level
MTBE	Methyl-tert-butyl ether
OCP	Oil Control Program
PCS	Potential Contaminant Source
PWS	Public Water Systems
SMCL	Secondary Maximum Contaminant Levels
SOC	Synthetic Organic Compound
SSP&A	S.S. Papadopoulos & Associates
SWA	Source Water Assessment
SWAA	Source Water Assessment Area
SWPP	Source Water Protection Plan
TTHM	Total Trihalomethanes
USEPA	United States Environmental Protection Agency
UST	Underground storage tanks
VOC	Volatile Organic Compounds
WAP	Water Appropriation Permit
WHPA	Wellhead Protection Area
WRE	Water Resource Element
WWTP	Waste Water Treatment Plant

REPORT

Section 1

Introduction

This Source Water Protection Plan (SWPP) was prepared for the Town of Myersville, Maryland by S.S. Papadopoulos & Associates (SSP&A) and Chesapeake Environmental Management (CEM). The plan was initiated and funded by the Maryland Department of the Environment (MDE) under Purchase Order # P2400301.

In the early 2000s, the MDE completed or contracted out completion of Source Water Assessments (SWAs) for public water systems (PWS) across the state. These reports were developed in accordance with Maryland's Source Water Assessment Plan (1999). The content of these reports included

- Designation of Source Water Assessment Areas (SWAAs)
- Identifying Potential Sources of Contamination, and
- Completing a Susceptibility Analysis for each PWS groundwater source.

Since completion of the Myersville SWAA Report in 2002, the Town of Myersville has added new sources of groundwater (wells) to its system. A significant portion of this report is therefore an update to the previous SWA Report, including an update to the SWAAs.

In completing this report, MDE provided assistance through access to files, databases, and Geographic Information Systems (GIS) data. The report contents were discussed with MDE, representatives of the Town of Myersville, and public input was solicited prior to finalization to help ensure that recommendations for Source Water Protection were consistent with the Town's needs and resources. The recommendations presented here, are however solely those of SSP&A and CEM.

1.1 Community Involvement

Opportunities for public involvement were provided during the course of this project. The goals and scope of the project were presented at the Town Council on Wednesday, March 7, 2012. Public notices prior to this meeting included a listing in the Meeting's agenda, and an announcement in the Frederick News Post.

Following input on a draft report from Town Staff and Town Council, a version of this report was presented to the Town Council at a public meeting on February 12, 2013.

Section 2

Background

The Town of Myersville (Figure 1) has a population of approximately 1,600 people and is located in the western part of Frederick County, approximately 10 miles northwest of Frederick. The Town is situated at an elevation of approximately 700 feet above MSL, and is within the Catoctin Creek watershed. Both Catoctin Creek and Grindstone Run flow within the Town boundaries (Figure 2).

Currently the Town obtains its drinking water supply from a combination of groundwater, spring water, and surface water sources. This water is supplied to approximately 550 homes and several commercial and institutional establishments. This report addresses all of the groundwater, surface water and spring sources associated with the Myersville Public Water System (PWSID 0100020).

2.1 Groundwater and Surface Water Sources; System Operations

Current and anticipated Water Appropriation Permits (WAP) for the Town of Myersville total 267,300 gallons per day (gpd) on average. Ten Water Appropriation Permits cover all sources (Tables 1 & 2). These permitted withdrawals include 16 separate sources from surface water, springs, and groundwater.

Among the WAPs are

- FR2004G001 - Quail Run EW-1 & PW-7
- FR2009G001 – Drees Wells at Saber Ridge and Catoctin Meadows ¹

The Quail Run wells EW-1 and PW-7 have been permitted by MDE, but are currently owned and operated by Buckeye Development LLC. It is anticipated that ownership and operation of these wells will be transferred to the Town. Consequently, these wells are included in our analysis.

The two newly constructed wells built by developers at Saber Ridge and Catoctin Meadows are not yet in use or fully permitted. The planned operations provide for the Catoctin Meadows well as the primary source, with the Saber Ridge well used to supplement supply at times of maximum use. Under an existing agreement between the Town and the developer (February, 2013), both wells will be dedicated to the Town, upon its acceptance of improvements, for use within its existing public system.

The sixteen sources covered by this report are shown in Table 2. Of these, all of the groundwater sources except for the Quail Run, Drees wells and Ashley Well #1 were included in MDE's 2002 Source Water Assessment report. The Quail Run and Drees wells are being evaluated for Source Water protection for the first time. The Ashley well, while not explicitly considered in the previous report, comprises part of the total appropriation for all three Ashley wells, and thus was partially incorporated.

¹ The permit for the Drees well has not received final approval from MDE; it is included here, however, in anticipation of its approval.

Generally, the Myersville water system relies on a large number of sources with limited capacity. To date, groundwater and surface water quality have been good, but two locations – the Springs intake and the Town well – have been categorized by MDE as groundwater under the direct influence of surface water (GUDI). This designation requires additional monitoring, and is an indication of greater susceptibility to surface water impacts than most groundwater sources.

Data provided by MDE indicate that since 1979, Myersville’s total water use has increased by a factor of four; most of this increase has been through the addition of wells and spring sources (Figure 3). The percentage of total water from surface water decreased from 100% prior to 1990 to 25%-30% in the past few years. In the past ten years (2002 to 2011), the Town of Myersville has appropriated between 46 million gallons and 77 million gallons per year, averaging about 56 million gallons a year. This is equivalent to an extraction rate of about 137,000 gpd (95gpm) on average.

Water usage within the Town of Myersville is generally divided between residential use (roughly 80% of the total daily demand) and a smaller amount of non-residential use (2009 Water Rate Study).

2.2 Previous Source Water Assessment and Protection Reports

In 1996, the MDE developed a Wellhead Protection Plan for the Town of Myersville (MDE, 1996). This was succeeded in 2002 by a Source Water Assessment for the Town of Myersville (MDE, 2002). The 2002 report was developed following procedures in Maryland’s Source Water Assessment Plan (MDE, 1999) and also included some recommendations for protection of Myersville’s groundwater supplies. These included:

- forming a local planning team, utilizing community volunteers, in conjunction with Frederick County, and consistent with the level of resources available
- engaging in public awareness and outreach, including road signs at the SWAA boundaries
- continued monitoring for water quality
- incorporating WHPA zoning considerations into planning/new development
- land acquisition/easements for protecting sources
- development of a contingency plan for the PWS
- periodic updates to the contaminant source inventory and Land Use changes

2.2.1 Recent Improvements to Town Public Water System

In response to MDE requests, the Town of Myersville has undertaken a number of efforts to improve its water and sewer systems and enhance the protection of source water since the most recent SWAP. Actions completed to date include (Town of Myersville, 2010):

- Completion of a Water Supply Capacity Management Plan (in 2007);
- Installation of water level measuring devices (data loggers) at each of the Town’s wells, and requirements for all future wells to have these devices (in 2008), and improved reporting of daily production and water levels;
- Installation of a weir to be used for measuring flow-bys in Little Catocin Creek (2009);

- Completion of a Water and Sewer Rate Analysis (Water Audit) in 2009, with updates planned every 3 years;
- Implementation of an annual hydrant flushing and reservoir cleaning schedule (in 2009);
- Increased community awareness through a new community newsletter that is submitted to all water and sewer customers and posted electronically with each quarterly billing cycle (started in 2009);
- Evaluation of the Spring Collection Boxes and some improvements, including replacement of five collection boxes and a new flowmeter (2009, 2011);
- Improvement of flow measurement for semi-annual reporting to MDE (in 2010);
- Posting the spring properties to limit site access (in 2010);
- Inclusion of long-term Capital Improvement Program for routine maintenance of the water and sewer systems, and its inclusion in annual budgets (in FY 2010);
- Performance of a fluid leak survey on the Town water system, with several small leaks identified; and additional investigation and work to address a known leak on the Easterday Road Main (repaired in 2011); and
- Purchase of more than 60 acres of land for wellhead/watershed protection area of the Town spring system (using state POS and CIN funds), bringing more than 75 acres of land including and surrounding the Town spring system under permanent Town ownership and protection (in 2012).

2.3 Water System Infrastructure

All water produced by the Myersville Public Water System is treated with sodium hypochlorite prior to distribution. The Town of Myersville currently operates three treatment plants (Plant IDs on Table 2). These are

- Treatment Plant 1 – For the Little Catocin Creek intake, Springs, Town Well, Reservoir Well, and the two Canada Hill wells
- Treatment Plant 3 – For the Ashley wells, and
- Treatment Plant 4 – for the Deerwoods and Doub’s Meadow wells.

Water from the springs is collected via PVC and cast iron pipes, and then fed through a 3” gravity line where it joins other groundwater sources for treatment before being routed for service to Town water users. The Town currently maintains almost 2 million gallons of surface water storage in the existing reservoir.

Section 3

Source Water Assessment

This section of the report provides the updated Source Water Assessment for the Town of Myersville. The primary driving force for this update is the addition of new sources since completion of the 2002 SWA report.

3.1 Hydrogeology and Hydrology

The Town of Myersville is situated in the Blue Ridge physiographic province of Maryland (Reger and Cleaves, 2008). This Province consists of two prominent ridges (the Catoctin and South Mountains) separated in the southern half by the rolling to hilly Middletown Valley. Myersville is situated in the Middletown Valley which rises in elevation northward from the Potomac River before merging with South and Catoctin Mountains (Figure 4).

Bedrock in the area of Myersville consists of Precambrian gneiss and metamorphic rocks, principally, the Catoctin Formation metabasalt (Brezinski and Fauth, 2009). All of Myersville's water supply wells are screened within the Catoctin metabasalt at depths ranging from 300 feet to 775 feet (Table 2). This aquifer, consisting of metamorphosed basaltic rocks, has a limited primary porosity, but provides useable amounts of groundwater through fractures (secondary porosity; Duigon and Dine, 1987)). In this area, groundwater occurs primarily under unconfined or semi-confined conditions in fractures in metamorphic and sedimentary rocks; its circulation is generally controlled by local topography (Duigon and Dine, 1987).

Groundwater is also collected from seven (7) springs on the east side of South Mountain, about two (2) miles north-northwest of the Town boundaries, at an elevation of about 1200 ft. The springs are reported to occur at a geologic contact between the Weverton Formation and a formation of meta-rhyolite and associated pyroclastics (MDE, 2002). The catchment area for these springs is entirely within the Little Catoctin Creek watershed, on the slopes of South Mountain.

The intake for surface water from Little Catoctin Creek is obtained at a weir approximately 1.3 miles north of the Town limits. The total area of the Little Catoctin watershed is approximately 7.3 square miles in area, and is underlain by metabasalts, meta-rhyolites, and meta-conglomerates of the Catoctin, Weverton, and Loudon Formations. The area upstream of the surface water intake is approximately 4.7 square miles in area. Additional information on land use within this watershed is discussed below.

3.2 Review of Water Quality Data

Maryland's Water Supply Program provided SSP&A with compiled analytical data reported by the Town of Myersville from 1991 to the present. For the purposes of this analysis, the most recent ten (10) years' worth of data are reviewed (2001 to 2010). Considering the numerous changes to the PWS since the 2002 SWAP, this time range is appropriate in order to consider any trends in water quality and potential susceptibilities. Data discussed here are compared to the US Environmental Protection Agency (USEPA)'s Maximum Contaminant levels (MCLs) and Maryland groundwater cleanup standards (MDE, 2008).

3.2.1 Volatile Organic Compounds (VOCs)

For the period from 2001 through 2010, 2,335 VOC analyses were reported for the Town of Myersville, from all three treatment plants. During this time period, six (6) VOCs were detected (Table 3):

- 1,2-Dichloroethane (1,2-DCA) (in TP-03, only)
- Methyl-tert-butyl ether (MTBE) (in TP-01 only)
- Trihalomethanes (in all three TP)
 - Bromodichloromethane
 - Bromoform
 - Chloroform
 - Dibromochloromethane

Trihalomethanes are formed when chlorine or other disinfectants used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter in water. These are regulated as a group – the Total Trihalomethanes (TTHM). The USEPA has established a Maximum Contaminant Level (MCL) of 80 micrograms per liter (ug/l) for the TTHMs. Under USEPA’s Stage 2 Disinfection Byproducts Rule (DBR), compliance with this standard is based upon an annual average value at each location. As shown in Table 3, for the period from 2001 to 2010, there has only been a single exceedance of the TTHM level; the annual averages have been lower than 40 ug/l.

MTBE and 1,2-DCA are man-made compounds that are often associated with releases of contaminants from underground tanks or surface releases. Detections of 1,2-DCA occurred at TP-03 on three occasions since 2000, with a maximum concentration of 1.2 ug/l. USEPA’s MCL for 1,2-DCA is 5 ug/l. Regular detections of MTBE occurred at TP-01 between the years 2000 and 2008, with a maximum concentration of 7.6 ug/l (Figure 5). The State of Maryland’s remediation standard and action level for MTBE is 20 ug/l. The USEPA does not currently have an MCL for MTBE.

3.2.2 Synthetic Organic Contaminants (SOCs)

Synthetic organic compounds detected in the Myersville Public Water System are summarized in Table 4. The contaminants detected were:

- Dalapon
- Pentachlorophenol
- Di(2-Ethylhexyl) Adipate
- Di(2-Ethylhexyl) Phthalate

Dalapon and pentachlorophenol are both used as herbicides and suggest impacts on groundwater from surface sources. Di(2-Ethylhexyl) adipate and di(2-Ethylhexyl) phthalate are both common plasticizers and laboratory contaminants and may not be indicative of water quality in the aquifer. None of these compounds were detected in excess of relevant groundwater standards.

3.2.3 Inorganic Compounds

Inorganic compounds reported in Myersville groundwater are summarized in Table 5. Many of these compounds can have both natural and man-made (anthropogenic) sources. None of the parameters listed in Table 5 have exceeded the relevant standard – MCL or secondary MCL – during the time period from 2001 to 2010.

Nitrate is a naturally-occurring ion that is also a contaminant associated with agricultural fertilizers and septic systems/sewage. None of the nitrate measurements reported for Myersville exceeded the MCL (10 milligrams per liter [mg/l]), or one-half the MCL. Charts of the nitrate concentrations at each treatment plant however, suggest that there may be an increasing trend in nitrate concentrations with time (Figure 6).

3.2.4 Coliform Bacteria

Total coliforms are a group of closely related, mostly harmless bacteria that live in soil and water as well as the gut of animals. The extent to which total coliforms are present in source water can indicate the general quality of that water and the likelihood that the water is contaminated with fecal matter from animals or humans or other more harmful pathogenic organisms/contamination. Total coliforms are currently controlled in drinking water regulations (Total Coliform Rule) because their presence above the standard indicates problems in treatment or in the distribution system. EPA requires all PWS to monitor for total coliforms in distribution systems. If total coliforms are found, then the public water system must further analyze that total coliform-positive sample to determine which specific types of coliforms (i.e., fecal coliforms or *E. coli*) are present.

Table 6 summarizes the coliform results for the Myersville system for the years 2001 to 2010. During this period, two positive detections for total coliform were reported, but there were no positive detections for fecal coliform. During the period from 1993-1999, raw water samples were also analyzed for bacteria for the Springs collection box and a number of wells. These are summarized in MDE (2002), and illustrate the presence of both total and fecal coliform in some raw, untreated samples from the springs collection box.

3.3 Source Water Assessment Areas

The Source Water Assessment Area describes the geographic boundary of areas providing water to public water systems. As per Maryland's Source Water Assessment Program Guidance (MDE, 1999), the primary tool to be used for delineating SWAAs for groundwater sources in areas of fractured bedrock is hydrogeologic mapping.

The following steps were used to define each SWAA for the Myersville system:

1. Each source location was visually inspected in the field, and then mapped using Geographic Information Systems (GIS);
2. Based upon the permitted average daily extraction value for each source, the total annual volume of recharge required was calculated;
3. Using MDE's drought annual recharge value for the Catoclin Creek watershed, the surface area required to meet the permitted annual withdrawal values was calculated;

4. Geologic maps of the area were reviewed, and stereo-pairs of air photos were reviewed to delineate any lineaments that might be related to local geologic structures
5. A digital elevation model (DEM) and topographic maps of the area were reviewed for topographic and hydrologic constraints on surface water flow; and
6. This information was combined to determine the minimum geographic extent and shape of the SWAA for each well that corresponded to the calculated recharge area.

The new SWAAs for each well are delineated on Figures 7 and 8. The SWAA for the reservoir well is represented by a circle with a radius of 1,000 feet. This is approximately twice the size required based upon the permitted pumping rate for this well (10,000 gpd). Based upon potential surface contamination issues, however, a minimum radius of 1,000 feet around each source was applied (see Section 5). This is also apparent in the shape of the SWAAs around Ashley Wells 2 & 3, the Canada Hill wells, and the Quail Run wells.

Due to this 1,000 foot constraint, the Canada Hill/WTP Well SWAA now extends slightly to the east of Highway 40, which is consistent with apparent hydraulic impacts observed east of Highway 40 during overlapping pumping tests of the Canada Hill and Water Treatment Plant wells in 2007 (Hammond, 2007).

3.4 Land Use

Land use in the Myersville area is illustrated in Figures 9 and 10, and in Table 7. These maps were based upon State of Maryland, Department of Planning 2010 Land Use coverages.

Land use varies considerably between SWAAs for groundwater sources. For example, the Deerwoods, Meadow and Ashley wells SWAA is superimposed on the eastern half of the Town's footprint. About half of this SWAA is allocated to residential and commercial/industrial property. The remaining half is largely agricultural. In contrast, the SWAA for the Quail Run wells is currently 75% agricultural, with less than 10% of the land allocated for residential use. All of this land resides within the demarcated Community Growth Area (Figure 1), however, and thus future land use is likely to change. This is illustrated on Figure 11, which shows the Frederick County Comprehensive Plan Land Use Designations.

Within the drainage area of the Little Catoctin Creek and the catchment area for the Springs source, the land use is primarily agricultural and forested, with lesser amounts of residential use. No mines or other large potential point sources of contamination were identified within these boundaries. Figure 11 does not display the surface water or spring intakes for the Myersville PWS. The catchment areas for these sources are designated for agricultural and natural resource uses.

Figure 12 illustrates the existing and planned extents of sewerage for the Myersville area. These uses are consistent with the Frederick County Comprehensive Plan and Town of Myersville Planning documents.

3.5 Potential Contaminant Sources

In August, 2012, staff of Chesapeake Environmental Management (CEM) completed a survey of the Myersville area to identify any Potential Contaminant Sources (PCS) that might be

located within or near the SWAAs. Identification and description of these PCS will assist in understanding current conditions with regard to threats to groundwater quality and contribute to the susceptibility analysis.

Prior to the field Survey, SSP&A obtained a database and shape file layers from MDE and USEPA to assist in identifying existing and new PCS. These layers included MD oil control program (OCP) sites, registered generators of hazardous waste (GHS), registered pesticide dealers, existing and out-of-service underground storage tanks (USTs), and Land Remediation Program sites. These were used to create preliminary maps and tables from which CEM staff worked to identify existing PCS.

Seven PCS were identified in the Myersville area (Table 8, Figure 13). These include underground storage tanks (USTs) at two gas stations, above-ground salt storage and diesel tanks on MD Route 40, and a cemetery within the SWAA boundary.

3.6 Susceptibility Analysis

As outlined in MDE's Source Water Assessment Program Plan (1999), the goal of a Susceptibility Analysis is to assess the potential for a water supply source to be contaminated at concentrations that would pose a concern or be affected in a way that is detrimental to the operation, health of consumers, or long-term viability of the supply. The methodology varies somewhat for surface water and groundwater sources, but both rely on existing water quality data, and an evaluation of potential contaminants of concern and their sources. Specifically, if any potential contaminant of concern exceeds $\frac{1}{2}$ the Federal MCL for 10% of the results, a more detailed evaluation is warranted.

Because Myersville relies on wells open to fractured bedrock and surface water for its water supplies, all of these sources are potentially susceptible to contamination from surface sources. The point sources previously identified in or near SWAAs associated with wells include potential sources of gasoline, motor oil, salts, and other man-made chemicals. No point sources, however, were identified for the surface water or spring sources.

As described above, several man-made compounds were identified in water samples from groundwater (wells associated with TP 1 and 3, Tables 3 & 4). These included the VOCs 1,2-DCA and MTBE, and the herbicides Dalapon and Pentachlorophenol. While none of these exceeded the relevant criteria for more detailed investigation, it is worth noting that land use in the SWAAs associated with Treatment Plants 1 and 3 includes a substantial portion of urban and residential area in the Town of Myersville (Figure 9). Similarly, residential and agricultural land in these areas may be a source of herbicides.

The only chemical to exceed $\frac{1}{2}$ of the relevant groundwater standard in more than 10% of the analyses reviewed were the total Trihalomethanes. Trihalomethanes are generally a product of water treatment, not surface use, and thus reflect chemical interactions in the three Treatment Plants.

As noted above, the nitrate concentrations in all Treatment Plants appear to have a slightly increasing trend over the data range (1990s to present). Increasing nitrate concentrations are a widespread concern associated with use of agricultural fertilizers. Elevated levels of nitrate may also reflect wastewater discharge from septic systems, wastewater treatment plants or animal waste. Nitrate levels associated with land use have previously been identified as a concern for the Catocin Watershed as a whole (Korsak and Smith, 2006). The increasing

concentrations of nitrate observed in the Myersville area therefore likely represent a regional rather than local impact; no point source wastewater discharges were identified within the SWAAs.

Two of the sources, the Town Well and the Spring Collection Boxes, are classified as under the direct influence of Surface Water (GUDI; Table 2). Raw water samples from these sources contained both total and fecal coliform (see MDE, 2002), although treated water samples have not been shown to be impacted by bacteria. Additional concerns for these wells therefore include bacteria, viruses and other pathogens. The current land use associated with the Town well SWAA is largely agricultural (pasture land) and low density residential. The land use associated with the springs collection boxes is almost exclusively forested, and includes 60 acres of preserved land recently purchased by the Town of Myersville. Were certain critical land uses implemented near these two sources (e.g. high-density animal feeding operations, high density unsewered development), the potential for biological contamination is higher than for non GUDI wells.

Section 4

Existing Provisions to Protect Source Water

This section addresses provisions of the Town and County codes that are currently in place to protect Myersville's water supply,

4.1 Town of Myersville Wellhead Protection Ordinance

Chapter 162 of the Town of Myersville Code includes a Wellhead Protection Ordinance for wellhead areas within the Town boundaries. This ordinance contains both a definition for Wellhead Protection Areas, as well as regulations for land use within those areas. The Wellhead Protection Ordinance defines a Wellhead Protection District as:

“That land area overlying the aquifer which contributes water to a public water supply well under the permitted withdrawal rate (average annual) and average annual recharge conditions that can be anticipated based on historical data. ...The Wellhead Protection District shall include a minimum of two zones of protection, with Zone 1 being the most restrictive. Zone 1 is based on a one-year time of travel, fixed radius or other assessment of an area most closely connected to the water supply. Zone 2 is based on a ten-year time of travel or by hydrogeologic boundaries. The boundary of Zone 3, when delineated, encompasses the total land area that is determined to provide recharge to a public water supply well. (Note: A twenty- or twenty-five-year time of travel may be used to mark the edge of Zone 2, if numerical modeling with particle tracking is used to delineate the wellhead protection area.)”

Permitted and Prohibited Land Uses within the WHPD are outlined in Table 9. The prohibited uses apply only to Zone 1. There are no prohibited uses in Zones 2 or 3. Exceptions are made for non-conforming land use that existed prior to implementation of this ordinance.

In 2007, Frederick County adopted a Wellhead Protection ordinance which applies to Frederick County jurisdiction. This ordinance is superseded by Myersville's.

4.2 Town of Myersville Water Resource Element (WRE)

In 2010, Myersville adopted a Comprehensive Plan incorporating a Water Resource Element (WRE; Town of Myersville, 2010). This WRE is linked to Frederick County's WRE and the County's Water and Sewerage Master Plan, and addresses the Town's water resources, wastewater system, stormwater management policies, and the ability of the Town to support future development without adversely affecting water resources. Selected policies and action items relevant to this SWPP are highlighted in Table 10.

In addition to the other items outlined in Table 10, the latest Maryland Stormwater Design Manual (revised 2009) requires stormwater management facilities for new development to treat stormwater using small-scale Environmental Site Design (ESD) facilities to the maximum extent practical. The Town can provide feedback to the developers to ensure that the stormwater features are designed and installed appropriately to have the greatest benefit for

water quality and quantity. Stormwater management plans should contain specifications for scheduled maintenance, which should be followed to ensure proper function.

4.3 Frederick County Water Resources Element (WRE)

The Frederick County Water Resources Element of its Comprehensive Plan was adopted in 2010. There are numerous aspects of the WRE that pertain to management of surface and groundwater water resources. These include general water resource policies, drinking water policies, drinking water action items, waste water action items and stormwater action items. Because some of Myersville's water supply lies outside of Town boundaries (Figure 7), within County jurisdiction, this information is relevant to management of those resources. Selected items relevant to Myersville area are summarized in Table 11.

Section 5

Recommendations for Source Water Protection

The following recommendations are provided for Protection of Myersville’s Source Water. Because some of the Town’s water is obtained from outside the Town boundaries (Figure 7), there are limits to the actions that Myersville can take on its own. Recommendations below include continued cooperation with Frederick County and the State of Maryland on water resource protection. Considering the Town’s limited size and resources, a phased implementation or prioritization may be appropriate.

5.1 Contamination Contingency Plan

The Town of Myersville maintains an Emergency Operation Plan, approved in 2010, that defines the actions to be taken by the Town, in coordination with the County, State and Federal Agencies, in case of a significant emergency or disaster within the Town’s corporate limits. The objectives of this plan are to protect public health and safety, preserve the environment, and protect public and private property. The plan, as written, is based on an all-hazard approach to emergency planning, and addresses the general functions that need to be addressed during any emergency. It is designed so that emergency response responsibilities are closely aligned to the day-to-day responsibilities of each responsible entity. The plan also assumes that, due to the Town’s limited resources, the County will be called upon to assist in responding to significant incidents in the Town.

Under the current plan, the Designated Department for addressing incidents relative to this SWPP are:

Type of Incident	Designated Department
Hazardous Material	Frederick County Division of Fire and Rescue Service
Pipeline Spill / Fire or Explosion	Frederick County Division of Fire and Rescue Service
Water distribution / Water Quality	Town of Myersville

Under scenarios that might pose a risk of contamination to groundwater or surface water supplies (spill, explosion, leak) any immediate threat to human health will be most appropriately addressed by the Town and County Fire and Rescue services. The longer-term, potential threats to drinking water supplies are appropriately addressed by the Town; under the current Plan, the Town Manager is responsible for addressing water and sewer infrastructure, and ensuring the continued supply of potable water.

It is recommended that the Town develop a Contamination Contingency Plan, to be consistent with, and appended to Town’s Emergency Operations Plan that specifically addresses the event of a contaminant spill within source water protection areas. This plan should include the following items:

5.1.1 Emergency Contact Lists

- Myersville Volunteer Fire Department (Fire, flood, building collapse, train derailment)
- Frederick County Division of Fire and Rescue Service (pipeline spill/release, hazardous material release [including gasoline or other substances stored in tanks])
- Town Manager (responsible for overseeing water supply and water quality)
- Town Manager (responsible for communicating with public)

5.1.2 Known PCS and Associated Chemicals

- Figure 13 and Table 8 from this report, and similar figures, as updated in future Source Water Protection Plans

5.1.3 Contamination Response Resources

- Town Manager (responsible for overseeing water supply and water quality)
- Town Engineering / Water Supply Consultants (for expert assistance)
- Frederick County Division of Utilities and Waste Management (expert assistance on water quality evaluation)

5.1.4 Generalized Response

For any release or spill of contaminants within or near a Source Water Protection Area, it will be the Town's responsibility to ensure that appropriate monitoring for contaminants of concern in the Town's water supply is completed. The Town will also communicate and cooperate with appropriate oversight agencies ensuring that any necessary remedial response (to soil or groundwater) is completed. Actions may include

- Determining the substances released, and their potential for transport with surface water and groundwater; determination may be made from direct sampling and analysis and inventory records;
- Determining appropriate analytical methods to use for detecting these substances in the water supply;
- Implementation of a sampling and analysis plan to monitor for migration of said contaminants in the Town's water supply;
- Remain aware of, and provide input regarding remedial measures.

The Contingency Plan will address steps the Town's role in ensuring that these actions occur; these steps will include

- Ensuring that the responsible parties, and relevant Federal, State and County agencies are notified of the need for site investigation and remediation
- Cooperation with MDE's Oil Control Program, Water Supply Program and other Programs as needed
- Cooperation with Frederick County's Department of Environmental Health
- Cooperation with the United States Environmental Protection Agency (if warranted)

- If necessary, use of technical consultants to assist the Town's evaluation of water quality concerns, and any steps the Town may need to take to restore surface water or groundwater quality.

5.1.5 Steps for Alerting the Public

Steps necessary to alert the public to water quality or water supply issues will be outlined. These will include existing measures currently used for public notification including

- Town emergency siren,
- Electronic signs in public areas, and
- Frederick County reverse-dial call notification.

In addition, as other measures become available, such as the Frederick County text alert system, these will be implemented and the Contingency Plan will be updated as appropriate.

5.1.6 Alternate Water Supply for Impacted Source(s)

In cases where the water supply to a well or surface water source is threatened, the Town will take steps necessary to replace that water until the problem can be solved. Under the existing infrastructure, the Town currently maintains almost 2 million gallons of surface water storage in the existing reservoir, which is sufficient for more than 20 day's supply. The following steps will be formalized in the Contingency Plan:

- In case of well outage, additional water will be supplied by
 - Temporarily increasing pumping at wells with unused capacity
 - Temporarily bringing online unused wells (e.g. Ashley 1)
 - Temporarily increasing creek withdrawals
 - Temporarily increasing spring withdrawals
 - Temporarily utilizing stored water in reservoir
- In case of short-term surface water contamination, additional water will be supplied
 - Temporarily increasing pumping at wells with unused capacity
 - Temporarily bringing online unused wells (e.g. Ashley 1)
 - Temporarily increasing creek withdrawals
 - Temporarily increasing spring withdrawals
- Should none of these options be available
 - Water for purchase and transport via truck is available within about 10 miles of Myersville.

5.2 Town Zoning and Water System Management

5.2.1 Definition of Wellhead Protection Areas and WHPA Ordinance

The WHPA ordinance currently in use by the Town of Myersville incorporates a definition of zones based upon contaminant travel time. This definition is more suited to groundwater sources in layered coastal plain sediments than in the fractured bedrock that is

found in Myersville. The WHPA ordinance adopted by Frederick County recommends that Wellhead Protection Areas be delineated as per Maryland's Source Water Assessment Reports, and consequently, as per Maryland's Source Water Assessment Plan (1999) Protocol.

MDE's (1999) plan recommends that "fracture trace analysis" be used to identify fractures closely connected to the well, and that areas closely connected to the well be considered as Zone 1. In practice, without detailed field tracer studies, identifying connection of fractures to an individual well is difficult. In Myersville, Because of the relatively small yield of each well, assuming a 1,000 foot radius around each well for Zone 1 creates overlapping circles comprising most of each composite SWAA. Consequently the following actions are recommended:

- Modify the Town of Myersville's Wellhead Protection Ordinance to eliminate the definition of zones based on groundwater travel time zones as this is not technically supported.
- Replace Zone 1 designation with a fixed radius of 1,000 feet around each well and apply prohibited land uses formerly applied to Zone 1 to this area.
- Include language incorporating the geographic areas of the SWAAs, and fixed radius Zone 1, and the incorporation into Town zoning requirements.
- It is recommended that the containment device definition be revised to specify that the containment device is sufficient to contain 100% of tank volume, or specify in the above/underground storage tank section (162-17.C+D). Also, above ground storage tanks should be prohibited in 162-13.A (besides heating oil as listed in the exceptions).

At some point in the future, the Town of Myersville may wish to undertake the type of tracer testing required to fully evaluate fracture connectedness, and at that point may consider a more detailed definition of Zone 1.

5.2.2 Digital Information/Mapping Resources

The Town should continue to develop mapping and GIS resources. This effort will allow local government to maintain and update high-precision geographic information related to SWAAs, water resources, PCS locations, potential effluent sources, and also provides the ability to generate custom maps. It is recommended that the SWAAs (as currently defined and subsequently updated) be permanently incorporated into the zoning and planning process as a required GIS layer.

These maps can be very useful in communicating information to the public and decision makers as it regards water policy and emergency response. At a minimum, it is recommended that the Town maintain hard copy maps that depict the boundaries of the SWAAs, PCS, critical infrastructure, emergency transportation options, and areas of high vulnerability.

5.2.3 Source Water Assessment Areas and Source Water Protection Planning

It is recommended that the Town update the delineation of SWAAs, and complete a new inventory of Potential Contaminant Sources, and a new Susceptibility Analysis at regular interval. An interval of every 6 years, to coincide with WRE updates, is recommended. This interval will be sufficient to account for identifying new trends in groundwater monitoring data,

zoning and land use. An updated Source Water Protection Plan should be completed and provided to the Town council after each review

Between the completion of each new SWPP, Town staff should work together to implement the recommendations of the most current SWPP, including prohibited and accepted land uses within each SWAA.

Coincident with this review of water supply susceptibility, continue to review the WHPD regulations approximately every 6 years. This will provide the Town with the opportunity to adjust items such as the prohibited land uses and will help to ensure that the WHPD regulations remain viable to implement.

Two of the sources, the Town Well and the Spring Collection Boxes, are classified as under the direct influence of Surface Water (GUDI; Table 2). Additional concerns for GUDI wells include enhanced susceptibility to bacteria, viruses and other pathogens. As noted above, the land use associated with the Town well is largely agricultural (pasture land) and low density residential. Land use associated with the springs collection boxes is almost exclusively forested. These land uses do not by themselves present an unusual level of concern for well contamination with pathogens. Continued enforcement of the Town's wellhead protection ordinance preventing certain agricultural uses (manure piles, animal waste pits, lagoons, and sewage sludge storage facilities) within Zone 1 will continue to ensure the safety of these wells.

5.2.4 Planning/ New Development

The following recommendations address possible changes to zoning and permitting requirements that may improve source water quality.

Consider Impervious Surface Restrictions – The WHPD currently restricts the total percentage of impervious surface that is permitted to be built within Zone 1 of the Recharge Area to 50% of the total lot area. The Town of Myersville should consider other options to increase the amount of rainfall that is infiltrated to the groundwater, while remaining consistent with the Town's WRE stormwater policies.

Coordinate with regional planning groups/activities – The Town should continue existing partnerships with Frederick County and continue to identify opportunities to work with regional planning organizations to participate in efforts such as the development of watershed planning and protection documents. The Town should ensure that adequate attention is provided to protecting the watershed draining to the wellheads. Additionally, regulations that expand or contract the development envelope in the Myersville service area should be considered as it affects the quantity and quality of the groundwater.

5.2.5 Physical Protection of Sources

For those water sources that are currently unprotected or minimally protected (e.g. Canada Hill and Meadow wells), it is recommended that the Town of Myersville take steps to protect the components from accidental or intentional damage. This would include steps such as installing bollards around wells, fencing the wellheads off from unpermitted activity, and marking the area with no trespassing signs. Protection of these wells will provide additional protection from surface water infiltration and potential impacts from bacteria, viruses and other pathogens.

5.3 Public / Governmental Interaction

5.3.1 Public Facilities Committee

The Town of Myersville currently maintains a Public Facilities Committee to provide recommendations to the Town Council. This committee is composed of volunteers appointed by the Mayor, Town staff act as advisors to the committee. The following items are proposed as additional charges for that Committee to assist in Source Water Protection

5.3.1.1 Source Water Protection (General)

It is recommended that the Town Council (or Administrator) support Source Water Protection as one of the charges of the Town's Public Facilities Committee. As part of this charge, the Committee should receive periodic briefings regarding the status of water use and operating issues. Additionally, the committee may discuss new methods of protecting and improving groundwater resource quality and quantity and may also hold non-binding votes on new regulations and policy directives of the Town on issues that directly or indirectly affect water quality or quantity. The results of the votes should be considered by the Council and/or Administrator when considering their own support or opposition to the subject regulation.

5.3.1.2 Inter-Governmental Communication Protocol

It is recommended that the Committee explore an agreement with Frederick County and MDE to explicitly detail the responsibilities of each party with regard to wellhead protection, water quality monitoring, remediation, and similar activities. This agreement would include the creation of two meeting dates per year for the Town and the relevant agencies to meet with each other and discuss the state of the water resources under consideration. Items to be included in this discussion would include newly submitted groundwater withdrawal applications, current monitoring efforts and results, enforcement and remediation efforts, regulatory changes, and significant development proposals.

5.3.1.3 Public Awareness and Outreach

It is recommended that the Public Facilities Committee be responsible for communicating the importance of groundwater protection amongst the citizens and business interests of the Town. The committee charge should include a robust outreach strategy that is focused on educating residents on how water issues affect each of them and how they can take steps to minimize their impacts. These efforts could include the development of educational materials and their distribution (with, for example, water quality reports and water bills), outreach events (sponsoring Water Day-type events at local schools to educate children), and sponsoring commercial programs designed to highlight local businesses who voluntarily enter into water protection or conservation programs.

5.3.2 Develop Signage for the Recharge Zones

It is recommended that the Town of Myersville develop update and maintain signage that indicates areas located in the Recharge Zones. These signs should be placed along main roads and within residential developments. The road signs can explain to the public that they are entering a protected drinking water watershed and provide contact info which can help people to identify and report spills.

Existing signage is currently in place near the Dobbs Meadow wells alerting pedestrians of the drinking water recharge area. Because of the coincidence of Route 40, two SWAAS that cross the route, and potential contaminant sources along this road, it is recommended that signs along Route 40 be evaluated, indicating to passing motorists that they are entering the recharge area for the Town's water supply. Similarly, signs may be considered for Route 17, along the primary entrance to the town from Route 70.

5.3.3 Land Acquisition

The Town of Myersville, in conjunction with Frederick County and/or state agencies, should pursue the acquisition of additional lands within the SWAAs and/or watersheds of concern. The return on investment for these sources should be measured by proximity to the sources, relative size of the parcel, and by the opportunity to create or preserve natural areas on that site. Because of the proximity of the Towns' wells to its Community Growth Area, this approach is most applicable to the Surface water sources, including the Spring Collection Box and portions of the Catocin Creek watershed upstream of the collection weir.

5.3.4 Funding Opportunities

The Town should pursue means of outside funding water quality improvement and community outreach efforts to offset additional costs incurred by protection measures and recommended actions identified. EPA and MDE provide opportunities for grants and loans through various programs targeted for specific purposes. Table 12 provides information pertaining to each funding opportunity and contact information to pursue funding.

Section 6

Conclusions and Summary

The Source Water Assessment for Myersville's Public Water System has been updated to account for the current permitted water withdrawals. New Source Water Assessment Areas have been delineated, using MDE's prescribed method of hydrogeologic mapping. These comprise 715 acres associated with groundwater sources and 3,225 acres associated with the watersheds upgradient of surface water supplies. The susceptibility analysis for the Myersville PWS finds that all of the groundwater and surface water sources are potentially susceptible to surface contamination, including VOCs, IOCs, and SOCs. Currently, the nitrate concentrations in water samples reported to MDE show a slight upward trend that should be watched for future concentrations in excess of relevant standards. In addition, TTHMs exceeded one-half the current drinking water standard in more than 10% of the analyses. Myersville should evaluate ways in which production of TTHMs can be reduced during water treatment.

Recommendations to the Town of Myersville include the following:

- Developing of an Contamination Contingency Plan as an addendum to the Town's Emergency Operations Plan
- Modifications to the Town's Definition of Wellhead Protection Areas and WHPA Ordinance to more closely reflect current practice in Maryland and provide an adequate Zone 1 for protecting wellheads
- Continuing to maintain and improve Digital Information/Mapping Resources
- Periodic updates to the Source Water Assessment Areas and Source Water Protection Planning
- Physical Protection of Water Sources
- Public / Governmental Interaction to be accomplished through the Town's Public Facilities Committee
 - Addressing Source Water Protection
 - Establishment of an Inter-Governmental Communication Protocol
 - Public Awareness and Outreach
- Development of Public Signage along major roads that cross the Recharge Zones
- Land Acquisition to further protect recharge areas

Section 7

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FIGURES

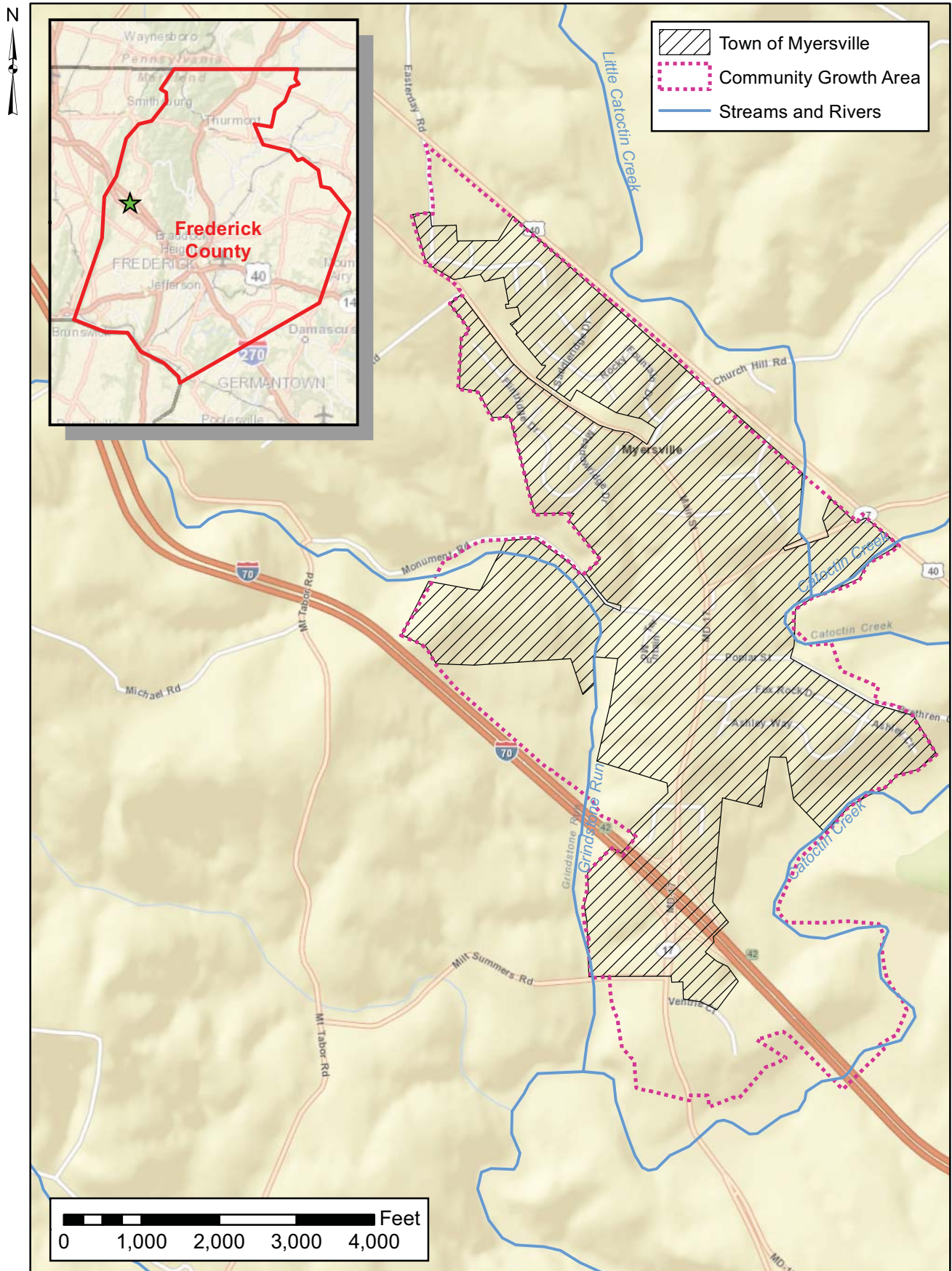


Figure 1 Location of Myersville, MD

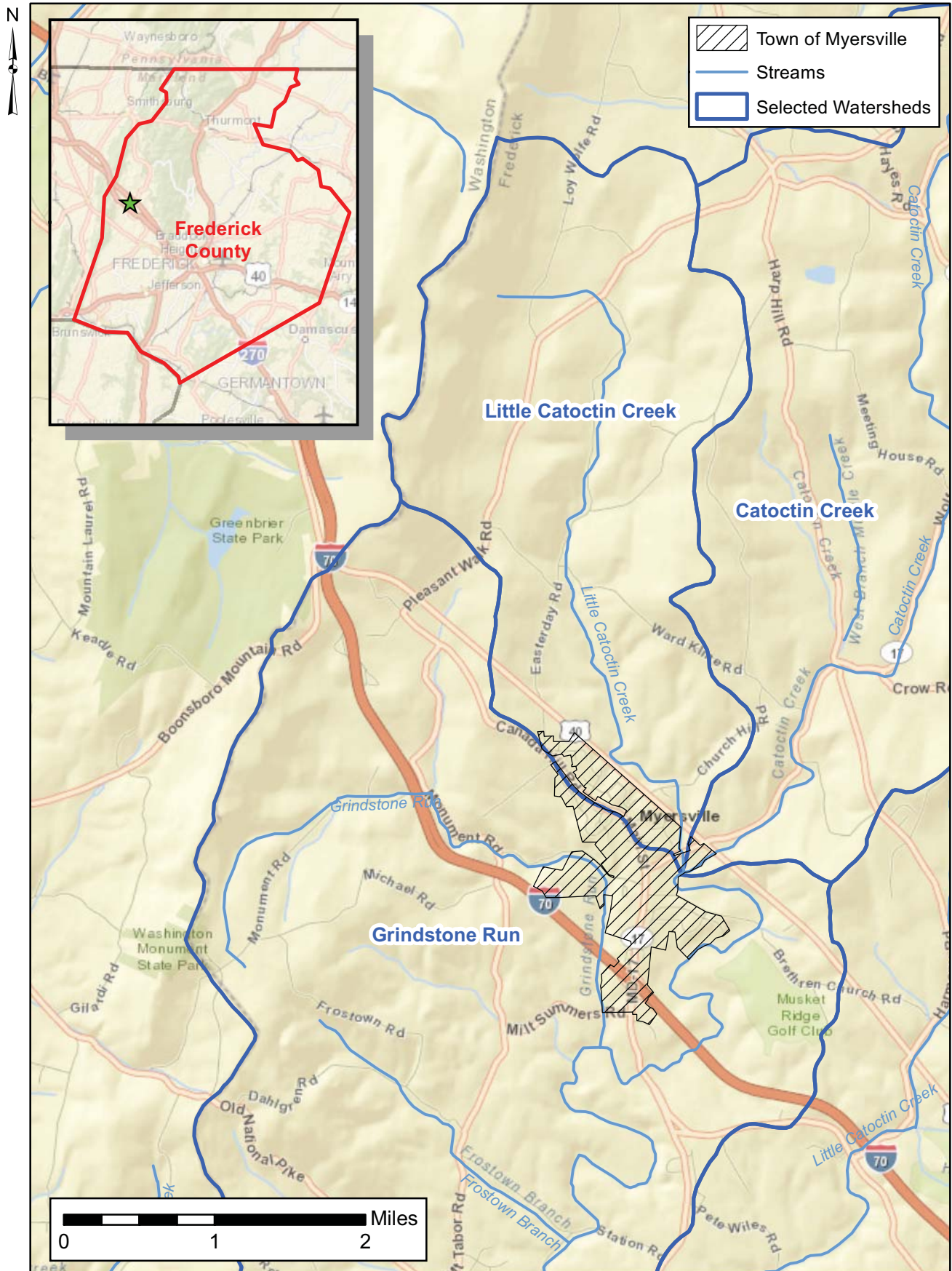


Figure 2 Watersheds in the Vicinity of Myersville, MD

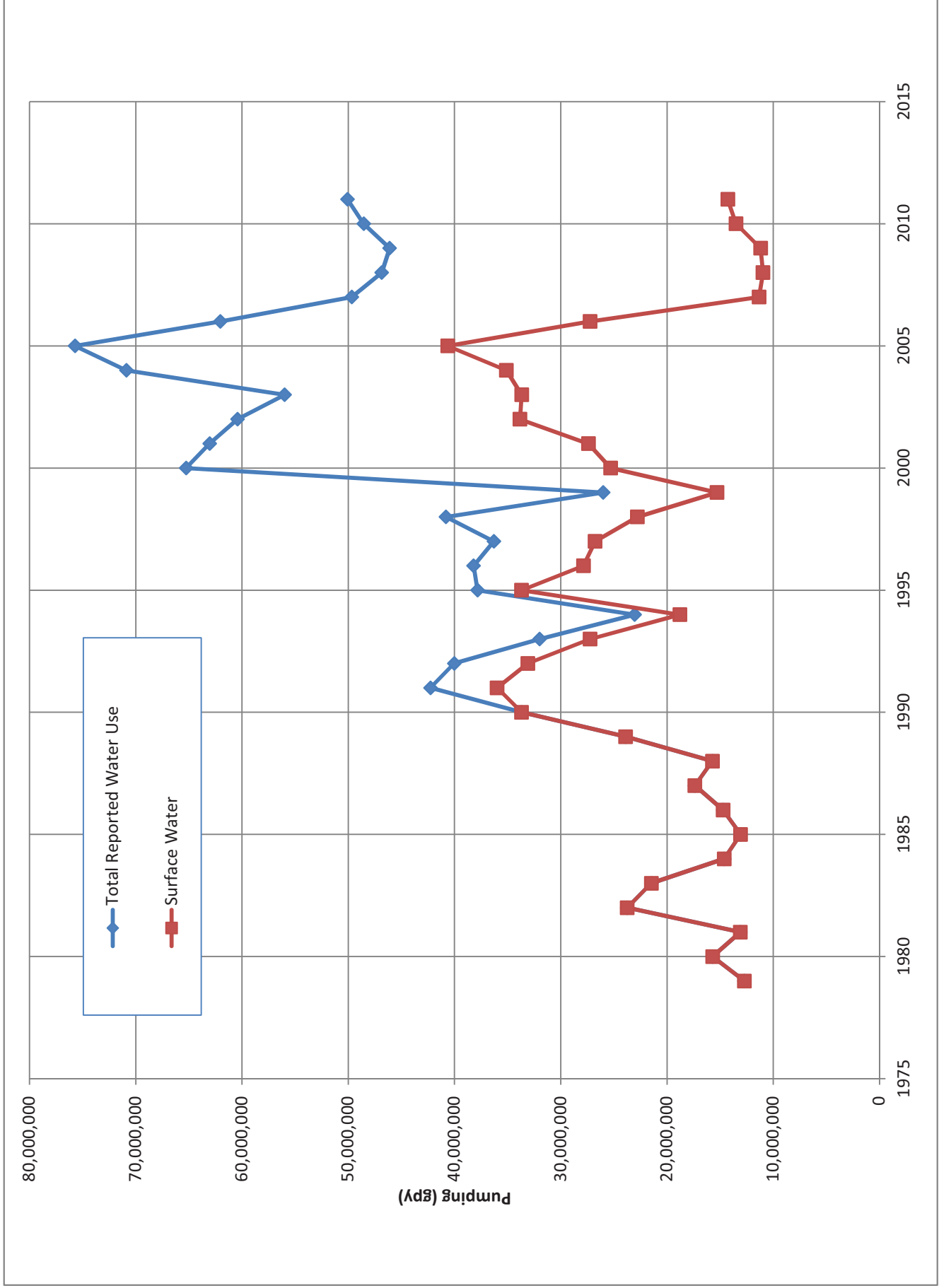


Figure 3 Reported Water Use by the Town of Myersville, 1979 to 2011

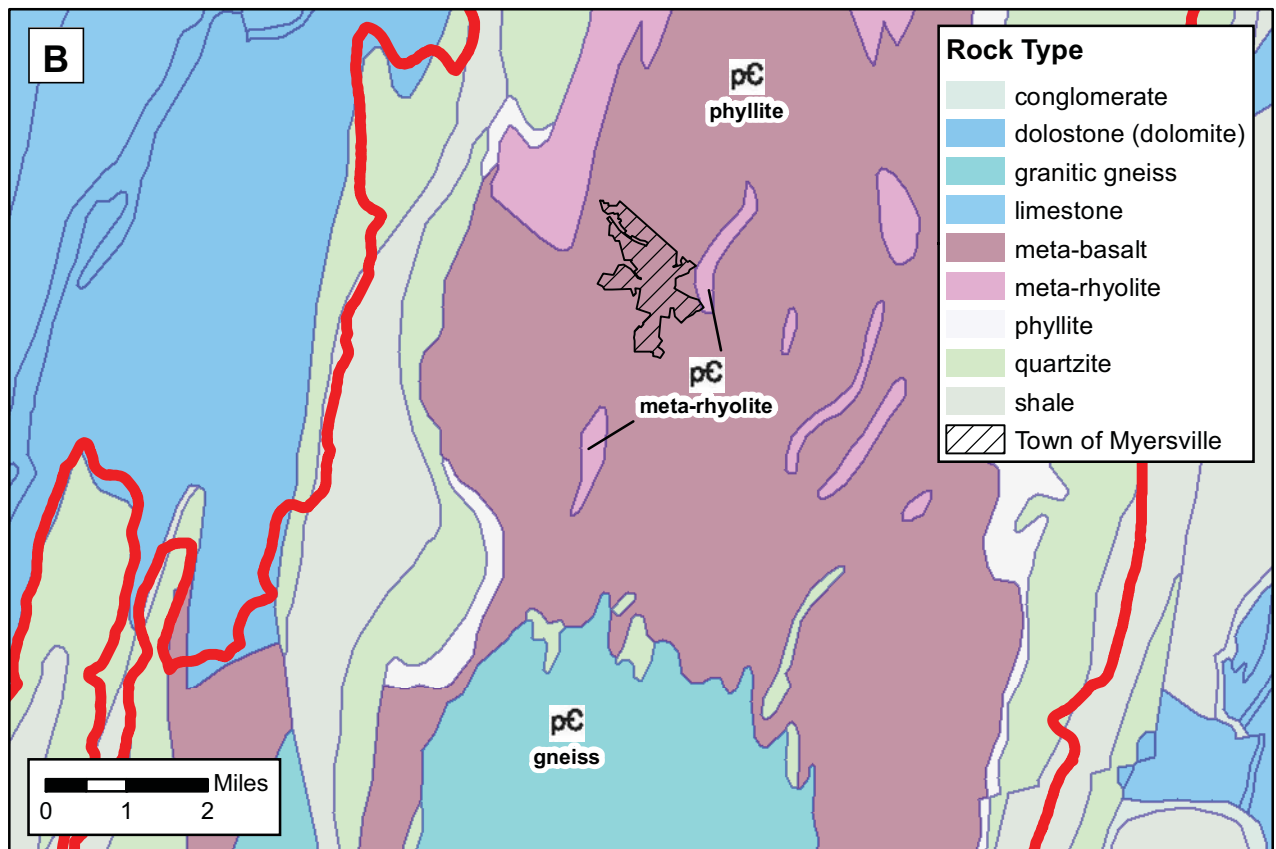
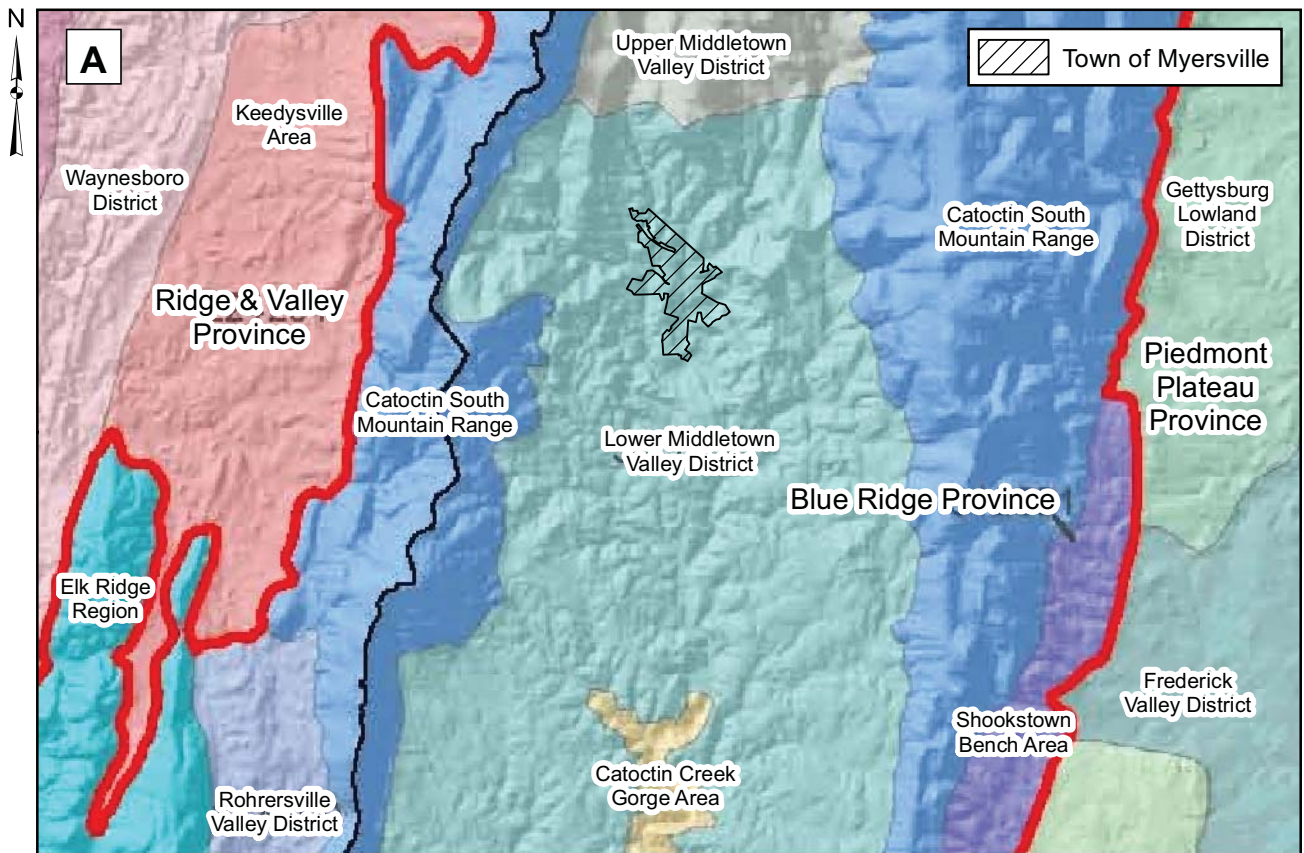


Figure 4 Physiographic Provinces of Maryland (A) and Bedrock Geology (B) in vicinity of Myersville, MD

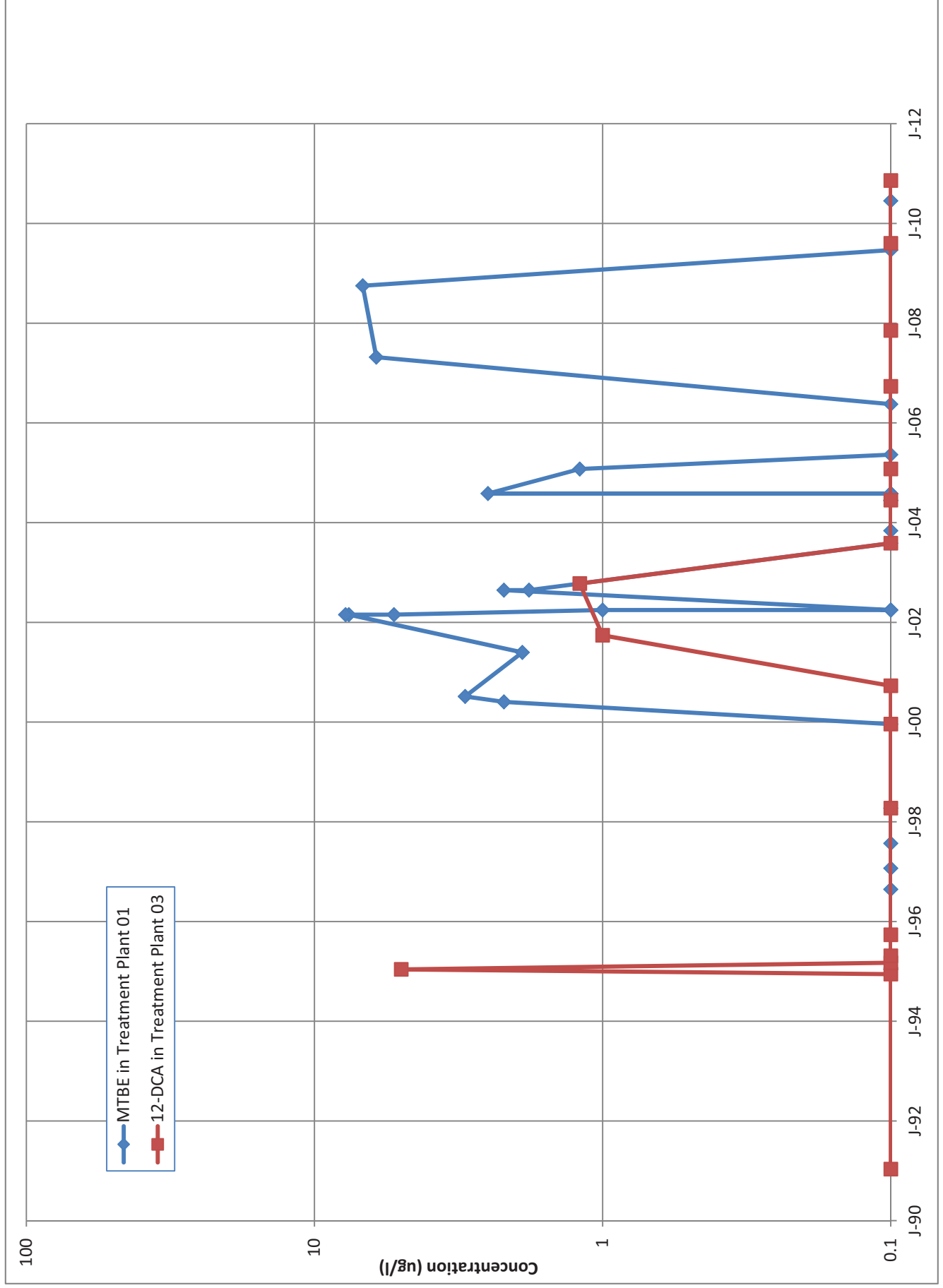


Figure 5 Concentrations of MTBE and 1,2-DCA Reported in Myersville PWS

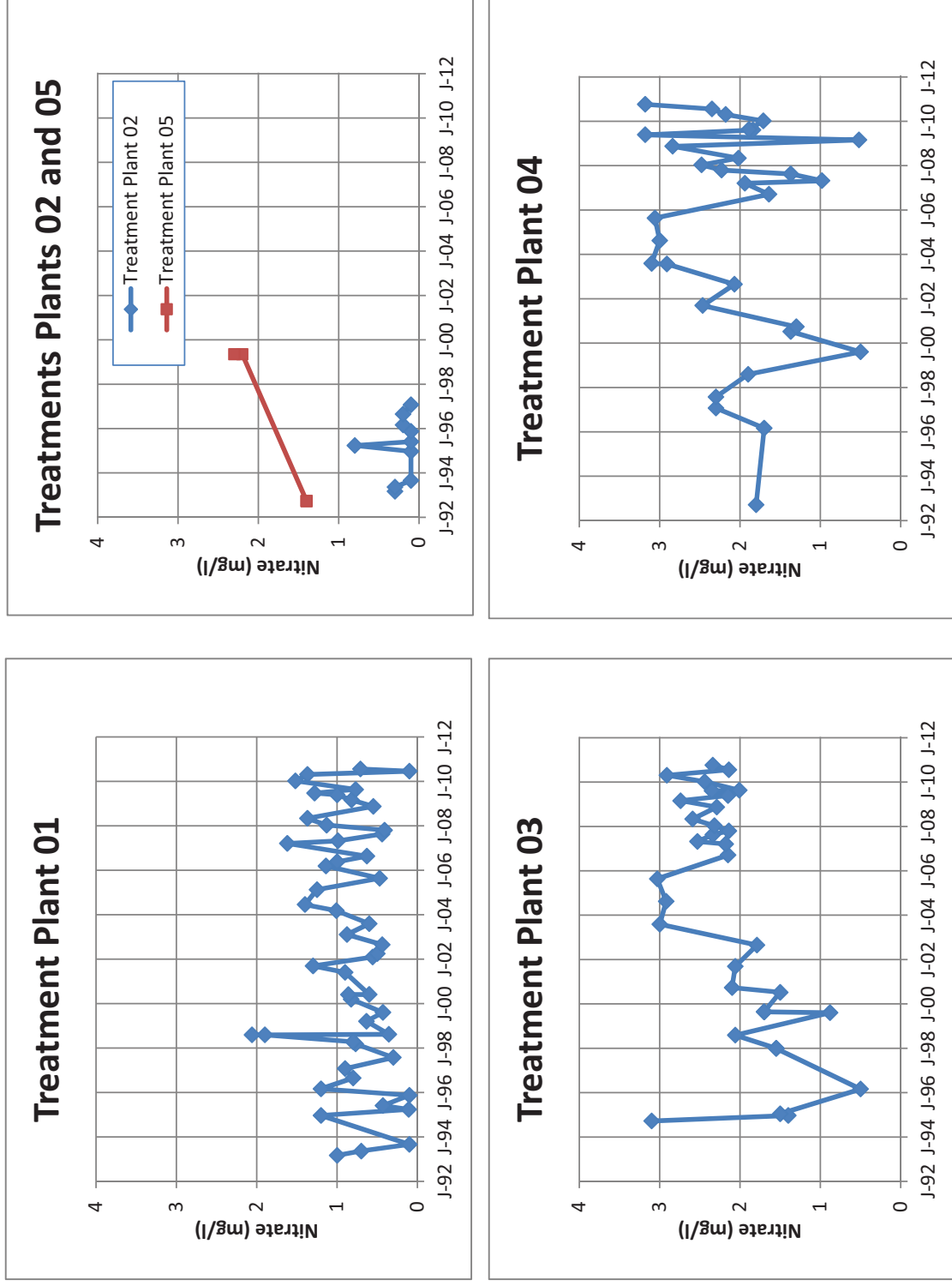


Figure 6 Nitrate Concentrations Reported for the Myersville Public Water System

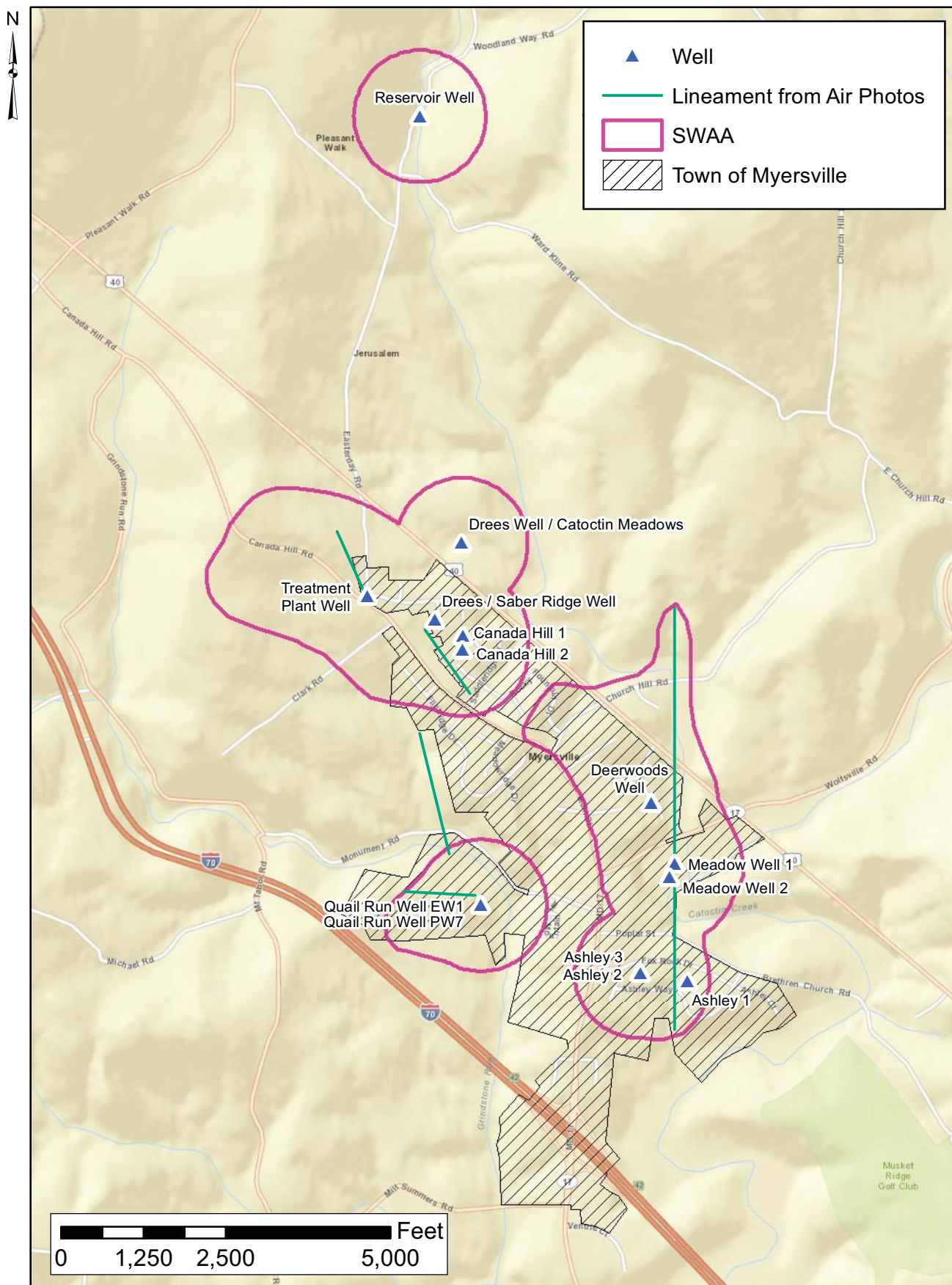


Figure 7 Source Water Assessment Areas (SWAAs) for Myersville Public Water System Wells

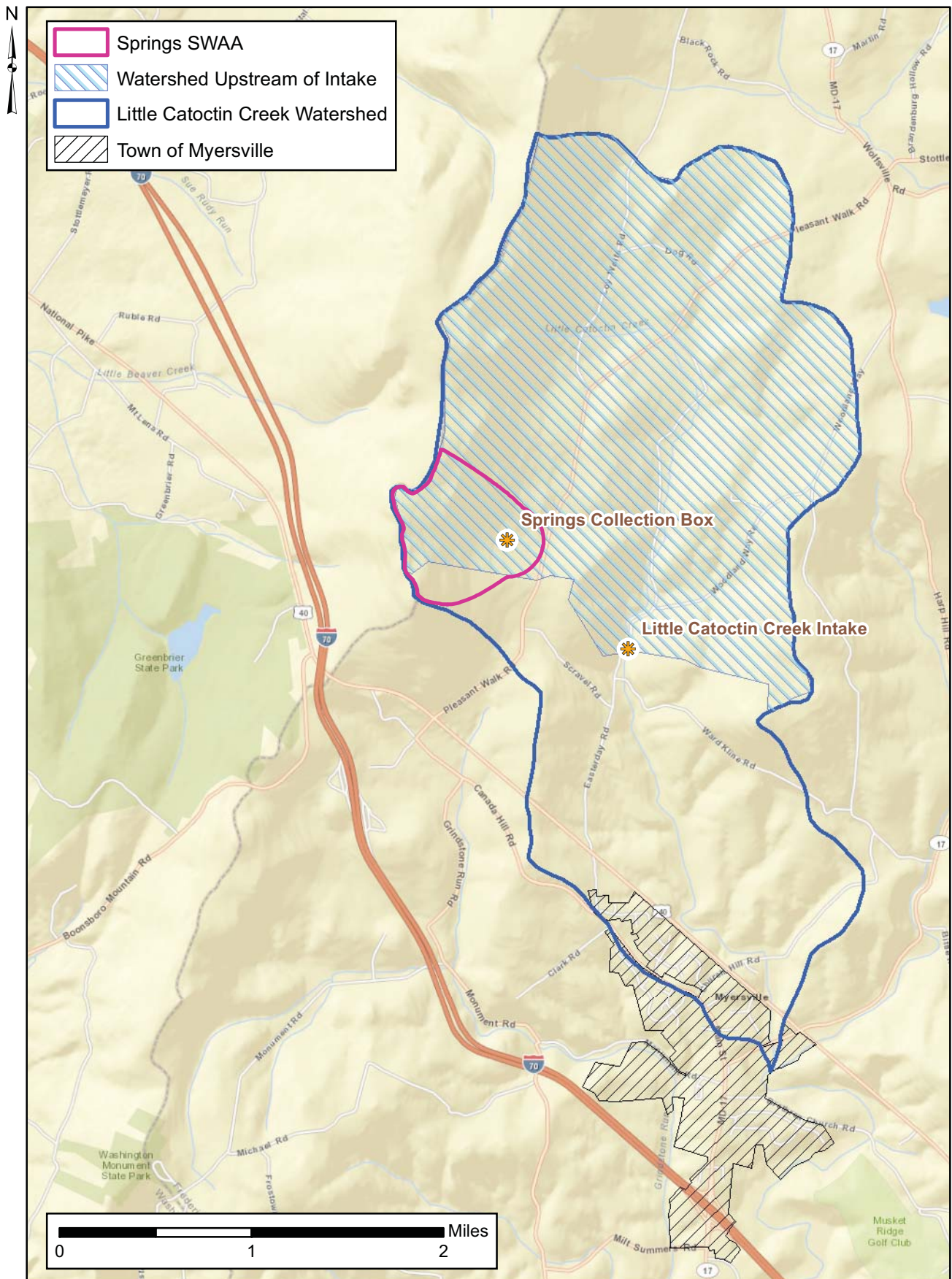


Figure 8 Source Water Assessment Area (SWAA) and Watershed for Myersville Public Water System Spring and Surface Water Sources

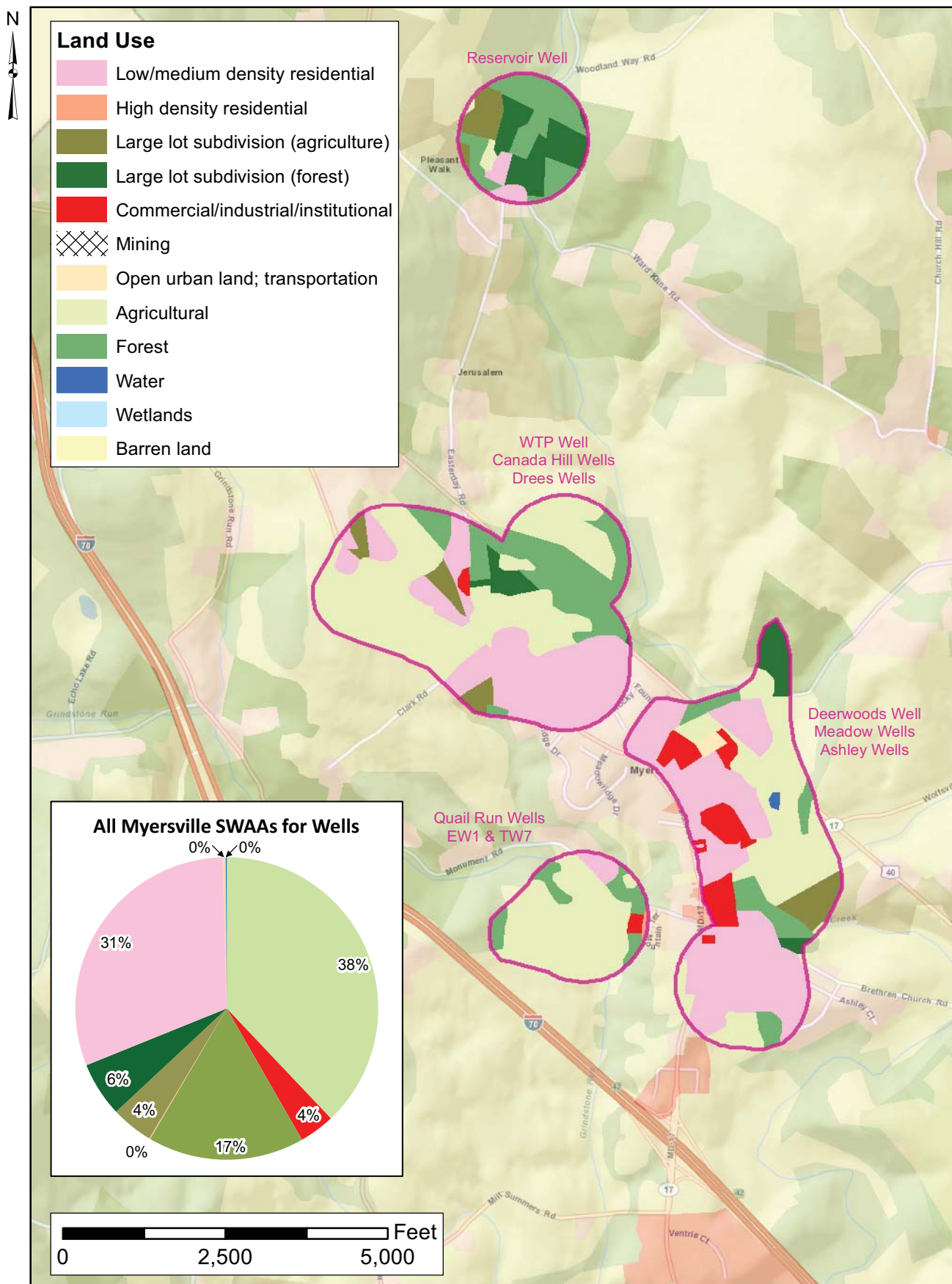


Figure ; Land Use in the SWAAs for Wells in the Myersville Public Water System

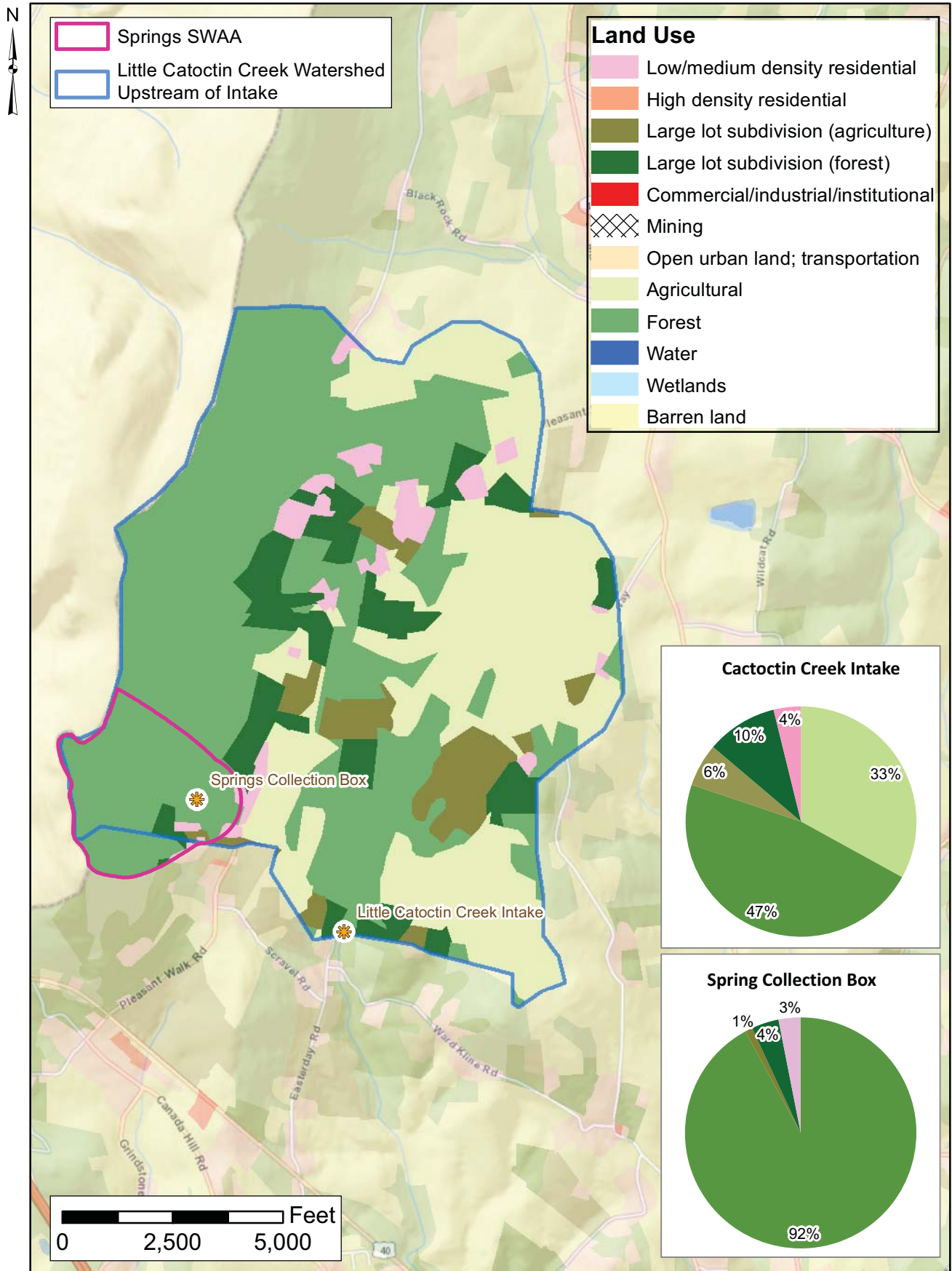


Figure 32 Land Use in the SWAA and Watershed for Myersville Public Water System Spring and Surface Water Sources

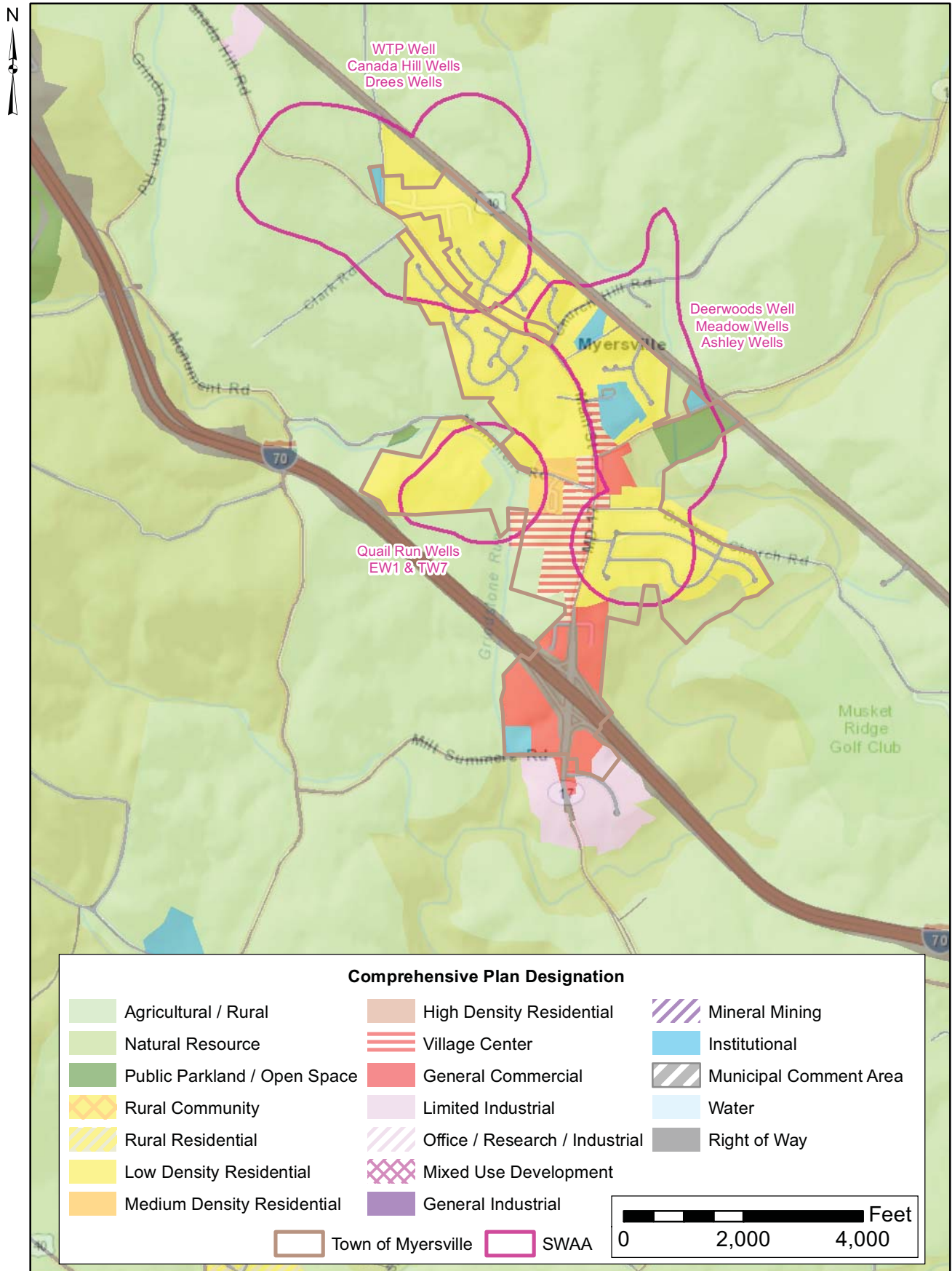


Figure 33 Land Use Designations from the Frederick County Comprehensive Plan

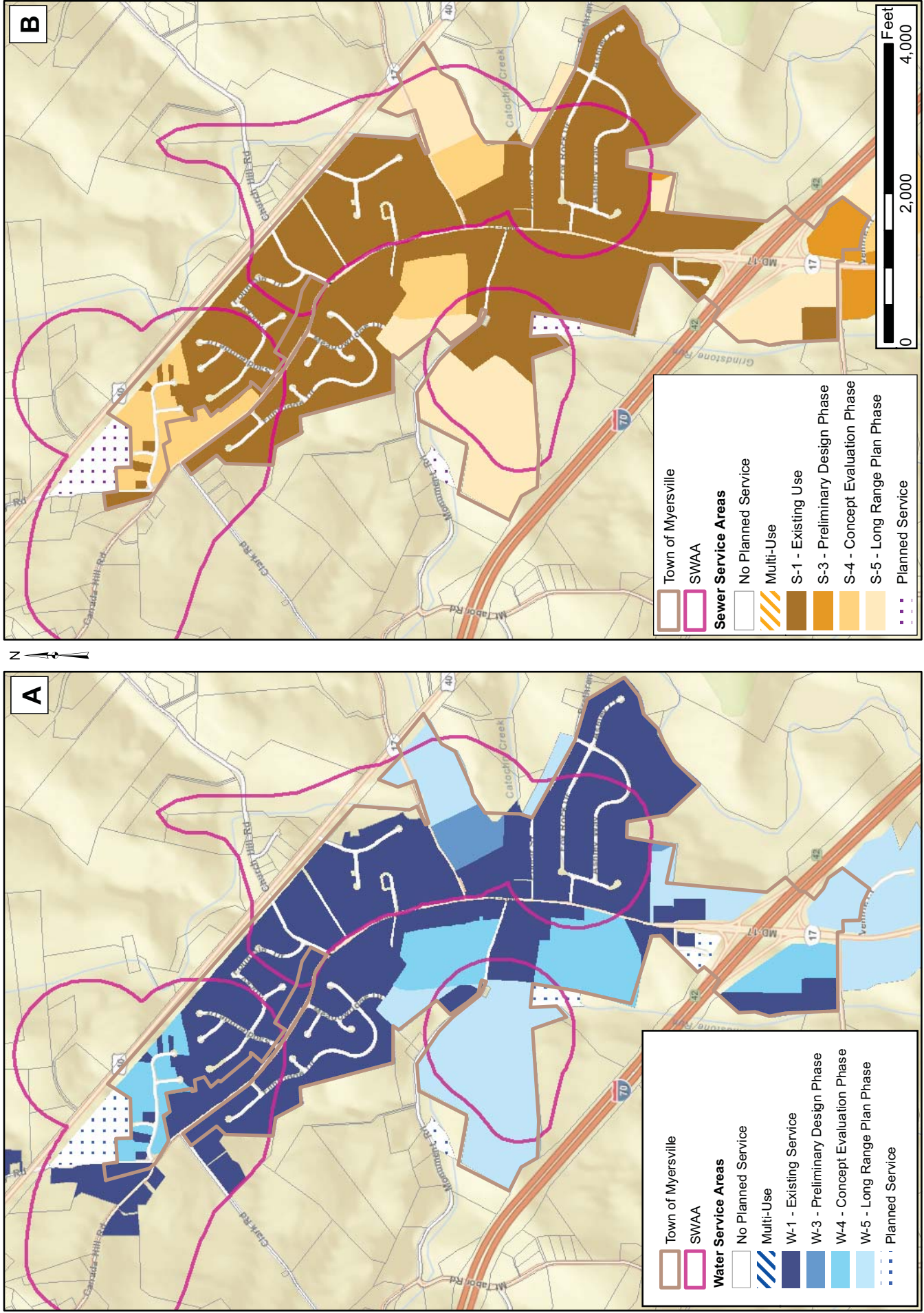


Figure 34 Water Service (A) and Sewer Service Areas (B) in the Vicinity of Myersville

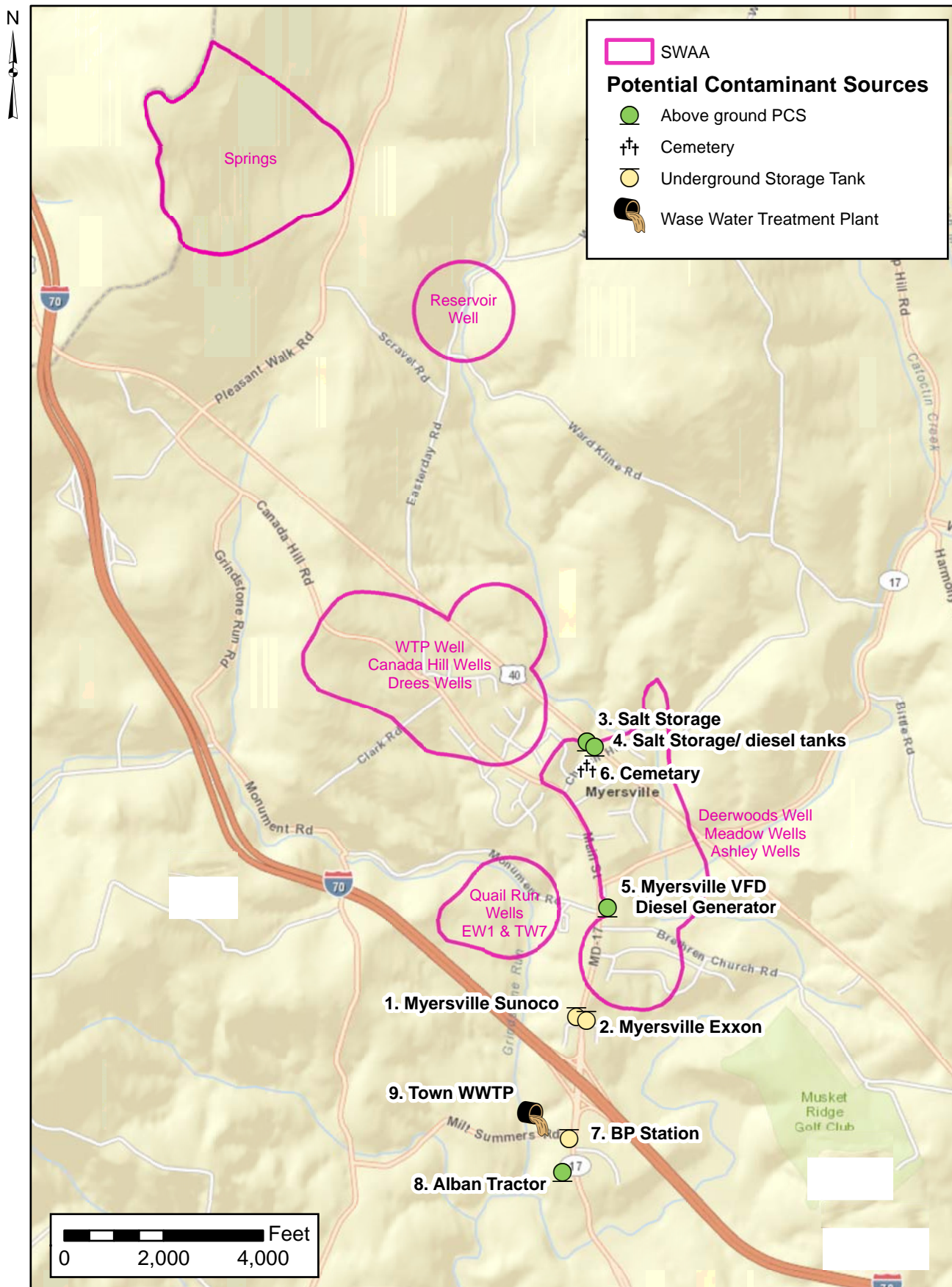


Figure 13 Potential Contaminant Sources in the Myersville Area

TABLES

TABLE 1 Water Appropriation Permits for Myersville

	WAPID	Owner	Sources	Average Gallons per Day (AGPD)	Maximum Gallons per Day (MGPD)
1	FR1964S003	Town Of Myersville	Little Catoctin Creek	40,000	150,000
2	FR1987G004	Town Of Myersville	Town Well (Plant Well)	13,000	26,000
3	FR1987G020	Town Of Myersville	Springs Collection Box	40,000	60,000
4	FR1987G104	Town Of Myersville	Ashley 1, 2 & 3	22,500	37,600
5	FR1987G204	Town Of Myersville	Deerwoods Well	16,000	18,000
6	FR1988G035	Town Of Myersville	Canada Hill 1 & 2	42,200	46,800
7	FR1995G022	Town Of Myersville	Doubs Meadow 1 & 2	38,000	57,000
8	FR1997G034	Town Of Myersville	Reservoir Well	10,000	15,000
9	FR2004G001	Buckeye Development, L.L.C. #	Quail Run EW-1 & PW-7	27,500	38,500
10	FR2009G001 #	Drees Homes (Saber Ridge) * # Five Forks / ERB, LLC (Catoctin Meadows) #	Saber Ridge/ Catoctin Meadows	18,100	27,200
	Total			267,300	---

* A previous Water Appropriation Permit (WAP) for the "Drees Well" WAP (FR2003G043) has been rescinded and is not considered here

Upon final approval, ownership will be transferred to the Town of Myersville

TABLE 2 Sources of the Myersville Public Water System

SOURCES ADDRESSED IN THIS REPORT												Sources In 2002 Swap Report?
	Source Type	Source ID	Plant ID	Source Name	Well Permit	WAPID	Total Depth (ft)	Casing Depth (ft)	Completion Date	GUDI?	Screened Interval	
1	SW	---	1	Catoctin Creek Intake	N/A	FR1964S003	N/A	N/A	N/A		N/A	---
2	SW	3	1	Springs Collection Boxes	N/A	FR1987G020	N/A	N/A	N/A	Yes	N/A	---
3	GW	2	1	Town Well (Plant Well)	FR814337	FR1987G004	N/A	N/A	N/A	Yes	N/A	Yes
4	GW	11	1	Reservoir Well	FR882380	FR1997G034	600	31	Aug-91		Catoctin Metabasalt	Yes
5	GW	4	3	Ashley 1 *	FR880774	FR1987G104	475	63	Oct-89		Catoctin Metabasalt	---
6	GW	5	3	Ashley 2	FR880904	FR1987G104	775	63	Oct-89		Catoctin Metabasalt	Yes
7	GW	13	3	Ashley 3	FR941494	FR1987G104	500	47	Aug-99		Catoctin Metabasalt	Yes
8	GW	6	4	Deerwoods Well	FR883046	FR1987G204	425	63	Aug-92		Catoctin Metabasalt	Yes
9	GW	8	4	Doubs Meadow 1	FR884606	FR1995G022	300	40	Jul-95		Catoctin Metabasalt	Yes
10	GW	7	4	Doubs Meadow 2	FR884605	FR1995G022	500	34	Jul-95		Catoctin Metabasalt	Yes
11	GW	9	1	Canada Hill 1	FR883098	FR1988G035	450	63	Sep-92		Catoctin Metabasalt	Yes
12	GW	10	1	Canada Hill 2	FR883400	FR1988G035	300	51	Mar-93		Catoctin Metabasalt	Yes
13	GW	N/A	N/A	Quail Run EW-1 #	FR883679	FR2004G001	300	34	Sep-93		Catoctin Metabasalt	---
14	GW	N/A	N/A	Quail Run PW-7 #	FR943891	FR2004G001	360	57	May-04		Catoctin Metabasalt	---
15	GW	N/A	N/A	Saber Ridge / Drees	---	FR2009G001	300	60	Apr-11		Catoctin Metabasalt	---
16	GW	N/A	N/A	Catoctin Meadows / Drees	---	FR2009G001	---	---	---		Catoctin Metabasalt	---

* Ashley #1 is erroneously reported as "Abandoned" in MDE's database

The Quail Run wells are currently permitted to a private owner, but are likely to be transferred to Town ownership

TABLE 3 Volatile Organic Compounds (VOCs) and Total Trihalomethanes (TTHM) Reported for the Myersville Public Water System

A. Non - Trihalomethanes

Contaminant	Plant ID	Earliest Detect Date	Most Recent Detect Date	Number of Analyses	Count of Detections	Max Concentration (ug/L)
1,2-Dichloroethane	3	October-02	August-09	9	3	1.2
Methyl-Tert-Butyl-Ether	1	March-02	October-08	50	28	7.8

B. Individual Trihalomethanes

Contaminant	Plant ID	Earliest Detect Date	Most Recent Detect Date	Number of Analyses	Count of Detections	Max Concentration (ug/L)
Bromodichloromethane	1	March-02	June-10	25	19	12.6
Bromodichloromethane	3	October-02	August-09	9	4	1.4
Bromodichloromethane	4	October-02	October-08	5	2	1.4
Bromoform	1	August-02	August-02	25	1	0.5
Bromoform	4	October-08	October-08	5	1	0.8
Chloroform	1	March-02	June-10	25	19	54.4
Chloroform	3	October-02	November-10	9	7	1.8
Chloroform	4	October-08	October-08	5	1	1.2
Dibromochloromethane	1	April-02	June-09	25	6	4.2
Dibromochloromethane	3	October-02	August-09	9	3	1.6
Dibromochloromethane	4	October-08	October-08	5	1	1.8

C. Total Trihalomethanes

Contaminant	Plant ID *	Number of Samples	Exceedances of One-Half MCL (40 ug/L)	Exceedances of MCL (80 ug/L)
Total Trihalomethanes	0	71	11	1
Total Trihalomethanes	1	31	8	

* TTHM Samples collected from the distribution system for regulatory compliance are assigned a Plant ID of "0"; other samples may be associated with specific treatment plants (TP)

TABLE 4 Synthetic Organic Compounds (SOCs) Reported in Myersville Public Water System

A. Data Summary

Contaminant	Plant ID	Earliest Detect Date	Most Recent Detect Date	Number of Analyses	Count of Detections	Max Concentration (ug/L)	MCL *
Dalapon	1	8/7/2003	6/21/2010	48	9	1.2	200
Di(2-Ethylhexyl) Adipate	1	5/29/2001	5/29/2001	27	3	0.6	400
Di(2-Ethylhexyl) Phthalate	1	5/29/2001	6/21/2010	270	30	4.6	6
Di(2-Ethylhexyl) Phthalate	3	8/7/2003	9/29/2006	54	6	1	6
Di(2-Ethylhexyl) Phthalate	4	8/7/2003	9/29/2006	54	6	1.3	6
Pentachlorophenol	3	8/13/2009	8/13/2009	17	3	0.02	1
Pentachlorophenol	4	8/13/2009	8/13/2009	17	3	0.01	1

B. MCL Exceedances

Contaminant	Plant ID	Number of Samples	Exceedances of One-Half MCL	Exceedances of MCL
Dalapon	1	48	---	---
Di(2-Ethylhexyl) Adipate	1	27	---	---
Di(2-Ethylhexyl) Phthalate	1	270	3	---
Di(2-Ethylhexyl) Phthalate	3	54	---	---
Di(2-Ethylhexyl) Phthalate	4	54	---	---
Pentachlorophenol	3	17	---	---
Pentachlorophenol	4	17	---	---

* Same as State of Maryland Groundwater Standards for Type I and Type II Aquifers

TABLE 5 Inorganic Compounds (IOCs) Reported in Myersville Public Water System

Contaminant	Number of Detections	Earliest Detect Date	Most Recent Detect Date	Min Concentration	Max Concentration	MCL	SMCL	Units
Alkalinity, Total	4	Sep-92	Aug-99	61	90			mg/L
Arsenic	1	Mar-95	Mar-95	0.001	0.001	0.01		mg/L
Barium	24	Dec-94	Nov-10	0.008	0.032	2		mg/L
Cadmium	1	Sep-92	Sep-92	0.003	0.003	0.005		mg/L
Calcium	3	Jun-94	Aug-99	22	32			mg/L
Chloride	4	Sep-92	Aug-99	5	20		250	mg/L
Chromium	4	Mar-95	Aug-99	0.001	0.003	0.1		mg/L
Combined Radium (226 & 228)	1	Oct-05	Oct-05	0.1	0.1	5		pCi/L
Conductivity @ 25 C	1	Aug-99	Aug-99	290	290			uMho
Copper	3	Sep-92	Aug-99	0.002	0.032	1.3	1	mg/L
Fluoride	12	Sep-92	Nov-10	0.01	0.17	4	2	mg/L
Gross Alpha	4	Aug-03	Oct-05	1	2	15		pCi/L
Gross Beta	6	Jan-95	May-05	1	4	50		pCi/L
Hardness, Total (as Cac03)	3	Jun-94	Aug-99	104	110			mg/L
Iron	3	Aug-99	Aug-09	0.01	0.1		0.3	mg/L
Lead	2	Sep-92	Aug-99	0.003	0.007	0.015		mg/L
Magnesium	2	Jun-94	Jun-94	8.89	10.9			mg/L
Manganese	1	Aug-99	Aug-99	0.037	0.037		0.05	mg/L
Nickel	1	Mar-95	Mar-95	0.001	0.001	0.1		mg/L
Nitrate	122	Sep-92	Oct-10	0.1	3.18	10		mg/L
Nitrite	4	Jan-95	Apr-98	0.002	0.01	1		mg/L
pH	8	Sep-92	Aug-99	6.3	7.5			pH
Radium-226	3	Aug-03	Oct-05	0.1	0.1			pCi/L
Radium-228	1	Aug-05	Aug-05	0.8	0.8			pCi/L
Radon-222	2	Dec-99	Dec-99	40	145	300		pCi/L
Selenium	1	Oct-07	Oct-07	0.002	0.002	0.05		mg/L
Sodium	43	Sep-92	Nov-10	4.99	27.9			mg/L
Sulfate	18	Mar-94	Aug-99	3.5	70.3		250	mg/L
Temperature (Centigrade)	1	Aug-99	Aug-99	15	15			Deg C
Total Dissolved Solids (TDS)	3	Jun-94	Aug-99	160	200		500	mg/L
Turbidity	1	Aug-99	Aug-99	2.2	2.2	5		NTU
Zinc	1	Aug-99	Aug-99	0.92	0.92		5	mg/L

TABLE 6 Total and Fecal Coliform Results Reported for the Myersville Public Water System

Routine Samples				Repeat Samples			
Number of Samples Collected	Number Positive for Total Coliform	Number Positive for Fecal Coliform	Number Indeterminate	Number of Samples Collected	Number Positive for Total Coliform	Number Positive for Fecal Coliform	Number Indeterminate
237	2	0	0	4	0	0	0

* Raw water results from GUDI Assessment are provided in MDE (2002)

TABLE 7 Land Use in the Myersville Area
A. Ground Water

Land Use	Acres					Percent of SWAA Acreage				
	Deerwoods Well, Meadow Wells, Ashley Wells	Quail Run Wells EW1 & TW7	Reservoir Well	WTP Well, Canada Hill Wells, Drees Wells	Total	Deerwoods Well, Meadow Wells, Ashley Wells	Quail Run Wells EW1 & TW7	Reservoir Well	WTP Well, Canada Hill Wells, Drees Wells	Total
Agricultural	78.2	62.4	2.4	128.4	271.3	29.1%	75.7%	3.4%	43.9%	37.9%
Commercial/industrial/institutional	24.2	1.5		1.4	27.0	9.0%	1.8%	0.0%	0.5%	3.8%
Forest	21.2	13.7	31.1	53.5	119.6	7.9%	16.7%	43.1%	18.3%	16.7%
High density residential		0.8			0.8	0.0%	0.9%	0.0%	0.0%	0.1%
Large lot subdivision (agriculture)	10.4		9.9	11.8	32.0	3.9%	0.0%	13.7%	4.0%	4.5%
Large lot subdivision (forest)	11.5		23.0	7.2	41.7	4.3%	0.0%	31.9%	2.5%	5.8%
Low/medium density residential	119.7	4.1	5.7	89.9	219.3	44.6%	4.9%	7.9%	30.8%	30.7%
Open urban land	2.5				2.5	0.9%	0.0%	0.0%	0.0%	0.3%
Water	0.8				0.8	0.3%	0.0%	0.0%	0.0%	0.1%
Total Acres	268.3	82.4	72.1	292.2	715.1	100.0%	100.0%	100.0%	100.0%	100.0%

B. Surface Water

Land Use	Acres				Percent of SWAA Acreage					
	Spring Collection Box	Catoctin Creek Intake			Total	Spring Collection Box	Catoctin Creek Intake			Total
Agricultural		980.2			980.2		33.0%			30.4%
Commercial/industrial/institutional					0.0					
Forest	236.1	1400.2			1636.3	92.1%	47.2%			50.7%
High density residential					0.0					
Large lot subdivision (agriculture)	2.7	179.0			181.7	1.0%	6.0%			5.6%
Large lot subdivision (forest)	9.8	295.4			305.2	3.8%	10.0%			9.5%
Low/medium density residential	7.9	113.8			121.7	3.1%	3.8%			3.8%
Open urban land					0.0					
Water					0.0					
Total Acres	256	2,969			3,225	100%	100%			100%

TABLE 8 Potential Contaminant Sources in the Myersville Area

No	Potential Contaminant Source	Comment	Type
1	Myersville Sunoco	Sunoco Gas station/ UST	UST
2	Myersville Exxon	Gas station/ UST	UST
3	Road Salt Storage	Salt storage	Above ground PCS
4	Salt storage/ diesel tanks	Salt storage/ diesel tanks	Above ground PCS
5	Myersville VFD Diesel Generator	Volunteer Fire Department diesel generator	Above ground PCS
6	Cemetery	Cemetery	Cemetery
7	BP Station	Gas station/ UST	UST
8	Alban Tractor	Above-Ground PCS	Above-Ground PCS
9	Wastewater Treatment Plant	Town WWTP	WWTP

TABLE 9 Provisions for Permitted and Prohibited Land Uses in Myersville’s Existing Wellhead Protection Ordinance

Permitted Land Uses within the Wellhead Protection District	Prohibited Land Uses within Zone 1 of the WHPD
Conservation of soil, water, plants, and wildlife;	Bulk storage of hazardous materials except the following: <ul style="list-style-type: none"> - Materials needed for normal household use, outdoor maintenance, and heating of a structure; - Waste oil retention facilities required by statute, rule, or regulation; - Materials needed for emergency generators; or - Materials used in water treatment plants
Outdoor recreation, nature study, boating, fishing, and hunting where otherwise legally permitted;	Dry-cleaning establishments, coin or commercial laundries
Foot, bicycle, and/or horse paths and bridges;	Garage, service station
Normal operation and maintenance of existing water bodies and dams, splash boards, and other water control, supply and conservation devices;	Heavy manufacturing uses
Maintenance, repair, and enlargement of any existing structure, subject to § 162-13, Prohibited uses;	Junkyards
Residential development, subject to § 162-13, Prohibited uses;	Yarding area
Farming, gardening, nursery, conservation, forestry, harvesting, and grazing, subject to § 162-13, Prohibited uses; and	Manure piles, animal waste pits, lagoons, and sewage sludge storage facilities
Construction, maintenance, repair, and enlargement of drinking water supply related facilities such as, but not limited to, wells, pipelines, aqueducts, and tunnels. Underground storage tanks related to these activities are not categorically permitted.	Metal plating establishments
	On-site wastewater disposal
	Open burning sites and dumps
	Quarries and mining operations
	Storage of deicing chemicals
	Disposal of fuels or hazardous materials
	Sanitary landfills and rubble fills
	Bulk storage and mixing of pesticides and fertilizers
	Underground injection wells
	Underground storage tanks
	Uses which involve, as a principal activity, the manufacture, storage, use, transport, or disposal of hazardous materials
	Uses which involve hazardous materials in quantities greater than those associated with normal household use
	Underground pipelines carrying hazardous materials
	Development with greater than 50% impervious surfaces (permitted with special exception)

TABLE 10 Selected Elements of Town of Myersville’s Water Resources Element (2010)

Key Drinking Water Policies
1. Maintain a safe and adequate drinking water supply to accommodate the needs of the current population as well as future generations.
2. Protect and enhance the quality of Myersville’s water resources with the goal of exceeding any regulatory requirements in place.
3. Diversify sources of public drinking water and explore alternatives in order to meet future demand.
4. Demand management strategies and conservation measures (water pricing, recycling, reuse) should be employed to maximize use of existing resources.
5. New development should be staged according to the availability and adequacy of drinking water service per the Town’s APFO which regulates new development.
6. Consider including adjacent properties on individual well construction within the growth boundary for future water service connection.
7. Encourage and support research on and monitoring of local ground water conditions, aquifer recharge, watersheds and streams.
Key Drinking Water Action Items
1. Investigate establishing a water recharge easement program as a way to increase the land area in the town for recharge purposes.
2. Initiate a comprehensive water conservation education program for citizens and businesses in Myersville stressing summertime (peak) demand management and an overall household reduction in water use (in gpd).
3. Develop a water-resources-based GIS database for staff to review in regard to development plans and proposals.
4. Work with the County to identify appropriate protection measures in the Town’s springhead and headwater areas that lie outside the town boundaries.
5. Advocate for more complete data regarding the availability and reliability of groundwater resources to assist town staff and the town board in making land use decisions.
6. Provide continued coordination with the County to collect and share consistent drinking water data.
7. Continue monitoring town wells to obtain source water capacity amounts in the Town.
8. Install a flow meter at the springhead to determine accurate flow rates.
9. Upgrade household meters in the Town to provide for more accurate readings of water consumption.
Key Wastewater Policies
1. During the comprehensive planning process, consideration will be given to include adjacent properties on individual well and septic construction for future water/sewer service connection.
Key Stormwater Policies
1. Encourage innovative technologies for stormwater management with appropriate review authorities by actively participating in the review plan process.
2. Promote coordinated planning between agencies responsible for drinking water, wastewater, and stormwater management.
3. The protection of ground and surface water quality shall be a factor in the approval of residential and non-residential development.
4. Minimize impervious cover within residential and non-residential development in order to reduce stormwater runoff.
5. Integrate watershed planning and management in the comprehensive planning process.
6. Encourage and support research on and monitoring of local ground water conditions, aquifer recharge, watersheds and streams.
Key Stormwater Action Items
1. Recommend development guidelines and best management practices that would minimize development’s impact on watersheds and water resources.
2. Build the environmental data set in the Town’s Geographic Information System and utilize during the development review process
3. Develop a water-resources-based GIS database for staff to review in regard to development plans and proposals.
4. Engage the public in watershed conservation and promote a stewardship ethic.

TABLE 11 Selected Elements of Frederick County’s Water Resources Element (2010)

Key General Water Resource Policies
WR-P-01 Provide community water/sewer service only within Community Growth Areas.
WR-P-02 Stage development within Community Growth Areas according to the adequacy of drinking water and wastewater treatment capacities.
WR-P-03 Consider including developed properties on well and septic within adjacent Community Growth Areas to facilitate connections to community water/sewer service.
WR-P-04 Minimize new development utilizing individual well and septic systems to protect the quality and quantity of ground water resources
Key Drinking Water Policies
WR-P-07 Protect community groundwater-based systems and individual wells in karst (limestone) areas.
WR-P-08 Support compatible land uses within designated wellhead protection areas.
Key Drinking Water Action Items
DW-A-01 Explore the application of water recharge easements as a complement to existing agricultural and land preservation easement programs.
DW-A-02 Explore the use of impoundments to supplement other drinking water sources.
DW-A-06 Develop a water conservation education program for residents and businesses of Frederick County.
DW-A-07 Develop a water-resources-based GIS database for staff to review in regard to development plans and proposals.
DW-A-11 Coordinate the development of GIS mapping and drinking water data with the municipalities.
DW-A-12 Identify means to keep pharmaceuticals and endocrine disruptors out of the County’s waste stream and wastewater treatment systems.
Key Waste Water Policies Action Items
WW-A-01 Explore funding sources and programs to address inflow and infiltration problems in wastewater collection systems.
WW-A-02 Identify and prioritize retrofitting failing septic systems using the Bay Restoration Fund (flush tax) and other programs.
WW-A-03 Require that new septic systems use the best technologies available to reduce nitrogen pollution.
WW-A-04 Identify means to reduce pharmaceuticals and other components believed to be endocrine disruptors out of the County’s wastewater streams and/or develop treatment strategies, which have been demonstrated to remove or destroy the contaminants.
Key Stormwater Policies and Action Items
SW-A-02 Develop an action plan to improve watershed health in watersheds where impervious cover is reaching or exceeding 10%.

TABLE 12 Source Water Protection Funding Opportunities

Organization/ Funding Opportunity	Contact	Description	Website
MDA			
Maryland Agricultural Water Quality Cost-Share (MACS) Program	Dawn Early (301) 695-2803 ext. 3	Provides farmers with grants for use of BMPs and cover crops to prevent soil erosion, manage nutrients and protect water quality.	http://mda.maryland.gov/resource_conservation/Pages/macs.aspx
Conservation Reserve Enhancement Program (CREP)	Dawn Early (301) 695-2803 ext. 3	Offers financial assistance above the rates offered by the traditional Conservation Reserve Program. Program places land in conservation reserve or provides cost-share assistance for BMPs	http://mda.maryland.gov/resource_conservation/Pages/crep.aspx
MDE			
Drinking Water Supply Assistance Program	Deborah Thomas (410)537-3722	Provides financial assistance for the acquisition, construction, rehabilitation and improvement of publicly owned water supply facilities to protect against health problems and meet federal SDWA requirements	http://www.mde.maryland.gov/programs/water/qualityfinancing/saterqualityfinancehome/pages/programs/waterprograms/water_quality_finance/wqfa_ws.aspx
319 Nonpoint Source Program	Eric Ruby (410) 537-3685 (800) 633-6101	Provides financial assistance for the implementation of nonpoint source best management practices and program enhancements as a means of controlling the loads of pollutants entering the State's waterways.	http://www.mde.state.md.us/programs/Water/319NonPointSource/Pages/Programs/WaterPrograms/319nps/index.aspx
Bay Restoration Fund Enhanced Nutrient Removal	Rajiv Chawla (410)537-3770 (800) 633-6101	Provides up to 100 percent grant funding to upgrade wastewater treatment plants to enhanced nutrient removal (ENR) technologies.	http://www.mde.state.md.us/programs/Water/BayRestorationFund/Pages/water/cbwrf/enr.aspx
Maryland's Nitrogen-Reducing Septic Upgrade Program	Shan Abeywickrama 410-537-3921	Onsite Disposal Systems (OSDS) Fund: Provides up to 100 percent in grant funding for upgrades of existing systems to best available technology for nitrogen removal or for the marginal cost of using best available technology instead of conventional technology. Priority given to failing OSDS in Critical Areas	http://www.mde.state.md.us/PROGRAMS/WATER/BAYRESTORATIONFUND/ONSITEDISPOSALSYSTEMS/Pages/Water/cbwrf/index.aspx
Biological Nutrient Removal Cost-Share Program	Ms. Elaine Dietz (410) 537-3908 (800) 633-6101	Provides grants to local municipalities and agencies for upgrading WWTPs with biological nitrification/denitrification facilities to achieve a goal of annual average effluent concentration of 8 mg/l total nitrogen.	http://www.mde.state.md.us/programs/Water/QualityFinancing/SaterQualityFinanceHome/Pages/programs/waterprograms/water_quality_finance/wqfa_bnr.aspx
Linked Deposit Water Quality Revolving Loan Fund (WQRLF) and Drinking Water Revolving Loan Fund (DWRLF)	Mr. Jag Khuman (410) 537-3119 (800) 633-6101	Provides a source of low-interest financing for certain water quality and drinking water capital projects. Below market interest rates are passed on to borrowers by participating commercial lenders with investment agreements with MDE	http://www.mde.state.md.us/programs/Water/QualityFinancing/LinkedDeposit/Pages/programs/waterprograms/water_quality_finance/link_deposit/index.aspx
Sewerage Facilities Supplemental Assistance Program	Ms. Heather Fleming (410) 537-3327 (800) 633-6101	Provides financial assistance to local governmental entities in the form of grants, supplementing the Water Quality Loan funds, where affordability is a problem and to correct public health or water quality problems	http://www.mde.state.md.us/programs/Water/QualityFinancing/SaterQualityFinanceHome/Pages/programs/waterprograms/water_quality_finance/wqfa_supplemental.aspx
State Revolving Loan Fund/ Water Quality Financing	Mr. Jag Khuman (410) 537-3119 (800) 633-6101	Provides a source of low interest financing to encourage private landowners, and water system owners to implement capital improvements that will protect or improve the quality of Maryland's water resources and provide safe drinking water.	http://www.mde.state.md.us/programs/Water/QualityFinancing/Pages/Programs/WaterPrograms/water_quality_finance/index.aspx
Water Supply Program/ Drinking Water Supply Assistance Program	Ms. Debbie Thomas (410) 537-3722 (800) 633-6101	Provides financial assistance to local governments or to water supply systems for wellhead protection projects and direct loans to local governments or to water supply systems for land acquisition for source water protection.	http://www.mde.state.md.us/programs/Water/QualityFinancing/SaterQualityFinanceHome/Pages/programs/waterprograms/water_quality_finance/wqfa_ws.aspx
UST Loan Program/ Linked Deposit WQRLF & DWRLF	Mr. Greg Sonberg (410) 537-3412 (800) 633-6101	A program through the Water Management Administration, known as Linked Deposit, may provide owners of underground oil storage tanks (UST) a way to replace those tanks.	http://www.mde.state.md.us/programs/Water/QualityFinancing/LinkedDeposit/Pages/programs/waterprograms/water_quality_finance/link_deposit/index.aspx
UST Reimbursement Program (Oil Contaminated Site Environmental Cleanup Fund)/ The Oil Control Program	Mr. Christopher Ralston (410) 537-3443 (800) 633-6101	Provides financial assistance to owners or operators of USTs by reimbursing them for costs incurred as a result of an oil contaminated site environmental cleanup project.	http://www.mde.state.md.us/programs/Land/OilControl/OilControlProgram/Pages/programs/landprograms/oil_control/pollution_management/index.aspx
Environmental Benefits Districts	Lisa Nissley (410) 537-3812 (800) 633-6101	Offers financial, technical, and other appropriate resources to benefit targeted communities. This is a new initiative developed by MDE to foster sound environmental practices, healthy and safe communities, and proactive economic development for all Marylanders.	http://www.mde.state.md.us/programs/crossmedia/EnvironmentalJustice/EJImplementationinMaryland/Pages/programs/multimedia/programs/environmental_justice/implementation/details.aspx#ebd
USDA			
Funding for Rural Communities	Brad King 301-797-0500 ext. 5	Provides assistance for rural businesses, housing and community facilities, and utilities through direct or guaranteed loans, grants, technical assistance, research and educational materials	http://www.rurdev.usda.gov/RD_Loans.html
Conservation Reserve Program (CRP)	Brad King 301-797-0500 ext. 5	Agricultural producers receive cost-share assistance to plant resource-conserving cover crops (improving water quality, controlling soil erosion and enhancing wildlife habitat) and receive annual rental payment for the contract term (10-15 years). Acts as an incentive to safeguard environmentally sensitive land	http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp-sp
Conservation Innovation Grant (CIG) Program	Gregorio Cruz (703) 235-8065	Provides grants for the development and adoption of innovative conservation approaches and technologies. Provides more options for environmental enhancement and compliance with agricultural regulations	http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044413.pdf
USEPA			
Assessment and Watershed Protection Program Grants (CFDA 66.480)	Federal Service Desk (866) 606-8220	Provides financial assistance for studies relating to water pollution, specifically for watershed management actions and policies.	https://www.cfda.gov/index?s=program&mode=form&tab=step1&id=8f560648f1725cee11f88ee3c25452ea
Environmental Education Regional Grants	Federal Service Desk (866) 606-8220	Provides financial assistance for environmental education projects that increase public awareness.	http://www.epa.gov/education/grants/index.html
Pollution Prevention Grants Program (CFDA 66.708)	Federal Service Desk (866) 606-8220	Provides financial assistance for pollution prevention technical assistance and projects for businesses.	https://cfda.symplcity.com/index?s=program&mode=form&tab=step1&id=15438a8058b068197cc298e0234f8695