



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



Source Water Protection Plan for the Bel Air, Maryland Public Water System

February, 2014

S.S. Papadopoulos & Associates, Inc.
7944 Wisconsin Avenue
Bethesda, Maryland 20814

and

Chesapeake Environmental Management, Inc.
42 North Main Street
Bel Air, MD 21014

Source Water Protection Plan for the Bel Air, Maryland Public Water System

Prepared for:

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

Prepared by:



S.S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants



Chesapeake Environmental Management, Inc.

February, 2014

7944 Wisconsin Avenue, Bethesda, Maryland 20814-3620 • (301) 718-8900

Table of Contents

	Page
List of Figures	iii
List of Tables	iii
Appendix A.....	iv
Attachment.....	iv
List of Acronyms	v
Section 1 Introduction.....	1
1.1 Community Involvement	1
Section 2 Background.....	2
2.1 Groundwater and Surface Water Sources; System Operations.....	2
2.2 Water System Infrastructure	3
2.3 Previous Source Water Assessment and Protection Reports	3
Section 3 Source Water Assessment.....	4
3.1 Hydrogeology and Hydrology	4
3.2 Review of Water Quality Data.....	4
3.2.1 Volatile Organic Compounds (VOCs).....	4
3.2.2 Synthetic Organic Contaminants (SOCs)	5
3.2.3 Inorganic Compounds	5
3.2.4 Coliform Bacteria.....	6
3.3 Source Water Assessment Areas.....	6
3.4 Land Use	7
3.5 Potential Contaminant Sources	8
3.6 Susceptibility Analysis.....	8
Section 4 Existing Provisions to Protect Source Water	9
4.1 Bel Air Comprehensive Plan, Water Resources Element (2009)	9
4.2 Harford County Water Source Protection Districts	9
4.3 Harford County Land Use Element Plan	10
4.4 Agricultural Land Preservation.....	10
Section 5 Recommendations for Source Water Protection.....	11
5.1 Contamination Contingency Plan	11
5.1.1 General Contents.....	11
5.1.2 Emergency Contact Lists	12
5.1.3 Known PCS and Associated Chemicals.....	12
5.1.4 Contamination Response Resources	12
5.1.5 Steps for Alerting the Public.....	13
5.1.6 Alternate Water Supply for Impacted Source(s).....	13

- 5.2 town Zoning and Water System Management..... 13
 - 5.2.1 Wellhead Protection Ordinance 13
 - 5.2.2 Digital Information/Mapping Resources..... 14
- 5.3 Source Water Assessment Areas and Source Water Protection Planning 14
- 5.4 Public / Governmental Interaction 15
 - 5.4.1 Source Water Protection Board..... 15
- 5.5 Public Awareness and Outreach 15
 - 5.5.1 Development of Outreach Strategy 15
 - 5.5.2 Develop Signage for the Recharge Zones 16
- 5.6 Land Acquisition and Easements 16
 - 5.6.1 Acquisition of Land..... 16
 - 5.6.2 Creation of Easements 16
- 5.7 Funding Opportunities 16
- 5.8 Implementation Schedule..... 17
- Section 6 Conclusions and Summary 18
- Section 7 References 19

Figures

Tables

Appendix A

Attachment

List of Figures

Figure 1	Location of Bel Air, Maryland
Figure 2	Reported Water Use by Maryland American Water Company for the town of Bel Air, 1979 to 2011
Figure 3	Physiographic Provinces of Maryland (A) and Bedrock Geology (B) in vicinity of Bel Air, MD
Figure 4	Annual Average TTHM Values for the Bel Air PWS
Figure 5	Source Water Assessment Areas (SWAAs) for Maryland American Water System Wells
Figure 6	Source Water Assessment Area (SWAA) and Watershed for Maryland American Water System Surface Water Source
Figure 7	Land Use in the SWAAs for Wells in the Maryland American Water System
Figure 8	Land Use in the Watershed for the Winters Run Intake
Figure 9	Zoning Designations (2009) for Harford County
Figure 10	Current (A) and Proposed (B) Land Use from the Bel Air Comprehensive Plan
Figure 11	Water Service (A) and Sewer Service Areas (B) in the Vicinity of Bel Air
Figure 12	Potential Contaminant Sources in the Bel Air Area
Figure 13	County and State Preserved Lands Upstream of the Winters Run Intake

List of Tables

Table 1	Water Appropriation Permits for the Maryland American Bel Air Water System
Table 2	Sources of the Maryland American Bel Air Water System
Table 3	Volatile Organic Compounds (VOCs) and Total Trihalomethanes (TTHM) Reported for the Maryland American Water System
Table 4	Synthetic Organic Compounds (SOCs) Reported in the Maryland American Water System
Table 5	Inorganic Compounds (IOCs) Reported in the Maryland American Water System
Table 6	Total and Fecal Coliform Results Reported for the Maryland American Water System
Table 7	Land Use in the Bel Air Area
Table 8	Potential Contaminant Sources in the Bel Air Area
Table 9	Selected Elements of Bel Air's Water Resources Element (2009)
Table 10	Selected Elements of Harford County's Source Water Protection Districts
Table 11	Source Water Protection Funding Opportunities
Table 12	Bel Air SWPP - Implementation Matrix



Appendix A

Appendix A Example Wellhead Protection Ordinance

Attachment

ArcGIS Shapefiles for Source Water Assessment Areas

List of Acronyms

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
GPM	Gallons per minute
GPY	Gallons per year
GUDI	Groundwater Under Direct Influence of Surface Water
HALPP	Harford Agricultural Land Preservation Program
IOC	Inorganic Compounds
MAWC	Maryland American Water Company
MCL	Maximum Contaminant Level
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 System
PWSID	Public Water System Identification Number
SMCL	Secondary Maximum Contaminant Level
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 tank
VOC	Volatile Organic Compound
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 Bel Air, 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 Source Water Assessments (SSWAAs) 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.

The Maryland American Water Company (MAWC) currently operates the Public Water System for the town of Bel Air (PWSID 0120003). The Source Water Assessment Report for Bel Air was completed in 2005 (MDE, 2005). A portion of this report is an update to the previous SWAP report, including an update to the SWAAs. The current report also addresses surface water derived from Winters Run.

In completing this report, MDE provided assistance through access to files, databases, and GIS data, and reviewed a draft version of the report. The report contents were also discussed with representatives of the town of Bel Air, Harford County, and Maryland American Water Company. Public input was solicited to help ensure that recommendations for Source Water Protection were consistent with the town's needs and resources.

1.1 Community Involvement

Opportunity for public involvement were provided during the course of this project. The goals and scope of the project were presented at the Bel Air town Hall on March 16, 2012, and the presentation was made available on the town's website. Public notices prior to this meeting included an advertisement in the Aegis, a newspaper published in Harford County. Copies of the final report will be provided to both the Town, as well as the Bel Air Public Library.

Section 2

Background

The town of Bel Air (Figure 1) has a population of about 10,000 people and is located in Harford County, approximately 20 miles northeast of Baltimore. The town is situated at an elevation of approximately 400 ft MSL, and is within the Bush River watershed. Both Winters Run and Bynum Run flow, tributaries to the Bush River, flow within the town boundaries (Figure 1). As noted in the town's Comprehensive Plan (Bel Air Planning Commission, 2009), "[part of] the town's drinking water service is drawn from Winters Run but only a fraction of the Winters Run watershed falls within the town's boundaries."

The majority of properties in the town of Bel Air receive water through the municipal water system of the Maryland American Water Company (MAWC). The MAWC service area includes both town and county residents and businesses totaling approximately 4,850 metered customers serving more than 13,000 people. Currently the town obtains its drinking water supply from a combination of groundwater and surface water sources. This report addresses both the groundwater and surface water sources.

2.1 Groundwater and Surface Water Sources; System Operations

The Maryland American Water Company Bel Air water system is currently permitted to withdraw 1,762,000 gallons per day (gpd) on average, from a total of three sources (Tables 1 & 2). The primary water supply is the Winters Run surface water intake, under Water Appropriation Permit (WAP) HA1976S015. This is supplemented by two groundwater wells: the Winters Run Plant Well (HA1994G060) and the Bynum Run Park Well (HA1996G022).

Data provided by MDE indicate that Bel Air's water use increased by almost 50% between 1979 and 1996 (Figure 2), during which time all of the water supply was provided by the Winters Run surface water source. The two groundwater wells were added in 1995/1996 and now account for about 10% of the total water use. For the ten most recent years of full data, MAWC has appropriated between about 225 and 514 million gallons per year, averaging about 431 million gallons a year. This is equivalent to an extraction rate of about 1.18 million gpd (820 gpm) on average.

Because of Bel Air's reliance upon surface water, the drought-year supply is a concern for current and future water demand. The town's comprehensive plan (2009) addresses ongoing efforts to evaluate additional well sites. Excluding purchased water, the available supply is considered appropriate for projected demands¹. Nonetheless, MWA does have a contract with Harford County to draw .5 MGD from the County's water system in times of drought or unfavorable water condition. The town is also evaluating an exploratory well in the Forest Hill area of Harford County. It is anticipated that the Forest Hill well could produce 300,000 gpd.

¹ MDE water appropriation permit HA1976S015 (05) requires a minimum flow-by at the Winters Run intake of 9.4 cubic feet per second (4,219 gpm).

2.2 Water System Infrastructure

MAWC owns and operates a water treatment plant that processes an average of 1,400,000 gallons per day (gpd) of surface water drawn from Winters Run and the Winters Run well. The plant is approved for a daily maximum surface water draw of 1,700,000 gallons. Treatment of surface and (less frequently) groundwater at the Winters Run Treatment Plant consists of filtration, flocculation and settlement, and chlorination. Up to six hours of water storage capacity is available for shutdowns, maintenance, etc. Water from the Bynum Park well is treated at its own wellhead plant for corrosion inhibition, filtration and chlorination.

2.3 Previous Source Water Assessment and Protection Reports

In 2005, the MDE developed a Source Water Assessment for the Maryland American – Bel Air water system (MDE, 2005). The report was developed following procedures in Maryland’s Source Water Assessment Plan (MDE, 1999) and also included some recommendations for protection of Bel Air’s water supply. These included:

- Forming a local planning team, utilizing community volunteers, in conjunction with Harford County, and consistent with the level of resources available
- Continued monitoring for water quality
- Engaging in public awareness and outreach, including road signs at the Source Water Assessment Area (SWAA) boundaries
- Land acquisition/easements for protecting sources
- Periodic well inspections and identification of new potential contaminant sources within the watershed and Wellhead Protection Areas (WHPAs)
- Incorporating WHPA zoning considerations and watershed protection into planning/new development
- Periodic updates to the contaminant source inventory and land use changes

.....

Section 3

Source Water Assessment

This section of the report provides the updated Source Water Assessment for the Maryland American Water Company and the town of Bel Air.

3.1 Hydrogeology and Hydrology

The town of Bel Air is situated in the upland portion of the Piedmont physiographic province of Maryland (Figure 3; Reger and Cleaves, 2008). The landscape is characterized by gently rolling to flat surfaces, dissected by many small streams. Bedrock in the area of Bel Air consists primarily of late Precambrian to early Paleozoic metamorphic rocks.

Winters Run is a spring-fed stream with a drainage area entirely within the Piedmont province. The Winters Run watershed is underlain by late Precambrian to early Paleozoic metamorphic rocks, gneiss, schist, and gabbro. Approximately 36 square miles of the watershed lies above the MAWC intake, west and northwest of Bel Air.

The two groundwater wells for the Maryland American water system are both completed in the Port Deposit Gneiss Formation of early Paleozoic age (Table 2). This unconfined aquifer consists of moderately to strongly deformed intrusive rocks including gneissic biotite quartz diorite, hornblende-biotite quartz diorite, and biotite granodiorite. The aquifer has a limited primary porosity, but provides useable amounts of water through fractures (MDE, 2005). The Winters Run Plant Well is 540 feet deep and the Bynum Run Park Well is 125 feet deep.

3.2 Review of Water Quality Data

Maryland's Water Supply Program provided SSP&A with compiled analytical data reported by the town of Bel Air from 1991 to 2011. For the purposes of this analysis, ten (10) full years' worth of data are reviewed (2001 to 2010). 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, 1,926 VOC analyses were reported for the town of Bel Air, from both treatment plants. During this time period, five (5) VOCs were detected (Table 3):

- Methyl-tert-butyl ether (MTBE)
- Total Xylenes
- Trihalomethanes
 - Bromodichloromethane
 - Chloroform
 - Dibromochloromethane

Methyl-tert-butyl ether (MTBE) is a man-made compound often associated with releases of gasoline from underground tanks. MTBE was detected at TP-02 (Bynum Run Park Well) in

2007, with a concentration of 0.9 ug/L. 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. Total xylenes were reported for TP-01 (Winters Run) at a concentration of 1.2 ug/l on one occasion in 2001. The Federal and State MCL for xylenes is 10,000 ug/l.

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 ug/l for the TTHMs under USEPA's Stage 2 Disinfection Byproducts Rule (DBR). As shown in Table 3, for the period from 2001 to 2010, there have been 23 exceedances of the TTHM MCL (80 ug/l) and 103 exceedances of ½ the MCL (40 ug/l). Compliance with the DBR standard is based upon an annual average value at each location, however. Figure 4 illustrates the annual average TTHM values. There was a single exceedance of the MCL in 1999, and the annual averages have generally decreased to below ½ the MCL since the mid 2000s.

3.2.2 Synthetic Organic Contaminants (SOCs)

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

- Atrazine
- Dalapon
- Decachlorobiphenyl
- Di(2-Ethylhexyl) Phthalate
- Metolachlor
- Pentachlorophenol

Atrazine, dalapon, metolachlor and pentachlorophenol are all used as herbicides or pesticides and likely reflect the impacts of agricultural land. Most of these contaminants were only found in TP-01 (which serves the Winters Run surface water intake and well). Dalapon, however, was also detected in 2009 in TP-02, suggesting impacts on the Bynum Run Park Well from surficial land use.

Decachlorobiphenyl is a polychlorinated biphenyl, a class of industrial chemicals. It was detected one time in TP-01 at concentrations below its MCL.

Di(2-Ethylhexyl) phthalate is a common plasticizer and laboratory contaminant and may not be indicative of water quality in the aquifer.

None of these compounds was detected in excess of relevant groundwater standards.

3.2.3 Inorganic Compounds

Inorganic compounds reported in Bel Air 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 Bel Air exceeded the MCL (10 mg/l) or one-half the MCL. The values for both TP-01 and TP-02 have remained about constant over this interval, in the same range of 2 – 4 mg/l, suggesting that unlike many watersheds in Maryland, neither the Winters Run nor Bynum Run watersheds are seeing long-term increases in nitrate.

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 reported coliform results for the Maryland American system for the years 2001 to 2010. During this period, one positive detection for total coliform was reported, but there were no positive detections for fecal coliform.

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 Maryland American system:

1. Each source location was visually inspected in the field, and then mapped in a Geographic Information System (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 baseflow value for the Little Gunpowder Falls stream gage (approximately 4 miles west of Bel Air), 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 5 and 6. The SWAA for the Bynum Run Park Well is the same as in the 2005 report except it now includes a 1000 foot buffer around the well, and the northeastern boundary has been slightly adjusted to follow an apparent fracture trace. The SWAA for the Winters Run Plant Well was re-sized (from 2005) to the approximately 260 acres required to meet the permitted withdrawal value based on drought annual recharge; the boundaries of the new SWAA are based on topography and it includes a minimum radius of 1,000 feet around the well. The SWAA now extends to the other side of Winters Run, which is reasonable considering the well is used as a backup supply during low-flow periods.

Within each wellhead SWAA a circular area depicting a 500-foot buffer around the well is shown. This is included as a possible Zone 1 for a proposed wellhead protection ordinance (see Section 5 and Appendix A).

The Source Water Assessment Area for the Winters Run intake consists of the entire watershed upstream of the intake. This was calculated from a digital elevation model (DEM) of Harford County, and is depicted on Figure 6. The total area of this watershed, upstream of the Winters Run intake is about 36 square miles.

3.4 Land Use

Land use in the Bel Air area is illustrated in Figures 7, 8, 9 and 10 and in Table 7. Land use and zoning data were obtained from Harford County (2012) for this analysis. Both SWAAs for the wells are dominated by residential, commercial and other developed land uses. SWAA for the Bynum Run Well is more than 75% residential and commercial/institutional, and does not include any agricultural land. The remaining quarter of the SWAA is forested or open space, including Rockfield Park, site of the well. The Winters Run well SWAA, being further from the town center, has more variable land use. About 45% of the Winters Run Plant Well SWAA is allocated to residential and commercial property, whereas 20% of the SWAA is agricultural.

Current and proposed future land use for the town of Bel Air are illustrated in Figure 11. The primary difference between current and future use is the conversion of institutional land to medium and high-density residential. Some of these areas are within the SWAA of the Bynum Run well.

The drainage area of Winters Run comprises about 36 square miles (23,225 acres) upstream of the surface water intake (Figure 9). Land use within this watershed is about 27% agricultural, 22% forested, with the remaining area mostly residential in nature. Figure 10 illustrates the Harford County zoning (2009) within and around the Winters' Run watershed.

Water and sewer service areas from the Bel Air Comprehensive Plan are shown in Figure 11. Both of the well SWAAs are entirely within areas served by both public water and public sewer service. In contrast, only a small proportion of the Winters Run watershed is similarly served. Since this portion of the watershed also coincides with the Harford County Development Envelope (Figure 10), potential groundwater impact from future water or septic will be limited in this area. The same may not be true for the rest of the Winters Run watershed upstream of the Bel Air intake.

3.5 Potential Contaminant Sources

In September, 2012, staff of Chesapeake Environmental Management (CEM) completed a survey of the Bel Air 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 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.

Thirty-one current PCS were identified in the Bel Air area (Table 8). These include five underground storage tanks (USTs) along with several diesel generators, auto service centers, and dry cleaners. Relatively few are within the SWAAs, but many border them, and are therefore noted here.

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.

Bel Air's primary water source, Winters Run is clearly susceptible to surface contamination. In addition, because Bel Air relies on wells open to fractured bedrock for its supplemental supply, these sources are also potentially susceptible to contamination from surface sources. To date, detections of volatile organic and synthetic organic compounds have been limited to relatively sparse results, below regulatory levels of concern. These have included pesticides and herbicides (e.g. Dalapon and Atrazine), and two compounds associated with gasoline – MTBE, and total Xylenes. None of these chemicals have exceeded $\frac{1}{2}$ of the relevant groundwater standard in more than 10% of the analyses, however. Elevated levels of TTHM that exceeded one-half the MCL have been decreasing in recent years, reflecting successful treatment that limits impact of suspended carbon in the surface water supply. In addition, while the land use for the Winters Run SWAA is largely agricultural, nitrate levels in finished water have not been increasing over time, nor in excess of one-half the MCL.

Section 4

Existing Provisions to Protect Source Water

Existing provisions to protect Bel Air's water supply are outlined below.

4.1 Bel Air Comprehensive Plan, Water Resources Element (2009)

Bel Air's Vision for its 2009 WRE is to "Protect the Winters Run and Bynum Run watersheds through adequate storm water quality and quantity practices, assure a safe, adequate water supply for area citizens, and meet State wide goals of protecting the Chesapeake Bay and its tributaries."

To achieve this vision, the WRE states a number of goals, objectives and action items. Items specifically addressing water quality include:

- Goal 1: Assure an adequate and safe water supply for current and future development.
- Goal 3: Protect the Winters Run and Bynum Run watersheds from the adverse impacts of land use change.

Additional details on the specific objectives and action items are presented in Table 9.

4.2 Harford County Water Source Protection Districts

Harford County has established Water Source Protection Districts (Chapter 267 of the Harford County Code, as amended). The purpose of establishing these districts was to provide a safe drinking water supply and to maintain public health, safety and quality of life. Uses that are considered to pose a high risk to groundwater and surface water are prohibited in these areas and impervious surface limitations may apply in some districts. Currently, the existing SWAAs for Bel Air's two groundwater sources are incorporated into Harford County's protection districts as Area 11. Prohibited land uses, stormwater management and other relevant issues are listed in the Harford County code and summarized in Table 10.

Specific goals of these rules include:

- Protect the quality and quantity of the groundwater and surface water that provide drinking water to the general public.
- Manage land use and development activities within the contributing areas in a manner that sustains the quality and quantity of the water source for the long term.
- Foster environmentally sensitive development within the contributing areas by setting forth standards that prevent negative impacts and by establishing mitigation measures that minimize the likelihood that the water sources will be impacted.
- Utilize other water resource protection regulations throughout this Part 1, such as §267-29 (Landscaping), §267-30 (Buffer Yards), §267-62 (Natural Resource District), §267-

53D(4)(c) (AG District), §267-59C(7)(e) (B1, B2 and B3 Business Districts), §267- 89D (Sanitary Landfills) and §267-90D (Rubble Landfills).

- Promote and encourage implementation of Watershed Restoration Action Strategies (WRAS) of Harford County.

4.3 Harford County Land Use Element Plan

The Land Use Element Plan is part of Harford County’s 2012 Master Plan and Land Use Element Plan. The Land Use Element Plan identifies opportunities to manage development and protect water quality. Watershed protection and reduction of pollutants identified in TMDL targets are specifically discussed.

4.4 Agricultural Land Preservation

As part of the County’s zoning and planning process, Harford County’s Agricultural and Historic Preservation section offers landowners the option to preserve their land through the Harford Agricultural Land Preservation Program (HALPP). The HALPP program allows for either a District Agreement or a perpetual Preservation Easement. A District Agreement is a 5-year commitment limiting the subdivision of a parcel in return for a tax credit. After the 5 year term has expired, the agreement and tax credit remain in effect until the property owner requests termination. Harford County Agricultural Land Preservation Easements are Purchase of Development Rights (PDR) contracts that permanently extinguish all preexisting development potential of a particular property and are not used to offset development elsewhere in the county. Other than very limited rights reserved to the original grantor and their immediate family, no further commercial or residential subdivision is allowed.

Similar district agreements and easements are available through the state of Maryland’s Maryland Agricultural Land Preservation Foundation (MALPF) for which MALPF easements are held by MD Department of Agriculture, which also oversees all settlements and administrative functions with Harford County staff. In addition, the Maryland Environmental Trust (MET) accepts donated easements that are individually negotiated with landowners. These are highly customized and site specific designed to protect a property’s environmental value, but do include specific restrictions on how, if any, further subdivision is permitted.

Finally, the state of Maryland also manages the Rural Legacy Program. Rural Legacy Areas are specifically delineated geographic areas that apply for and receive separate grants through the MD Department of Natural Resources, with the resultant easements including specific resource protection conditions as well as the permanent retirement of development rights. In addition to agricultural value, applications are evaluated on specific natural resource protection features. Currently, Harford County administers the Deer Creek Rural Legacy Area, but no parts of the Winters Run watershed are managed under this program. Portions of the Manor Rural Legacy Area bound the northwest corner of the Winters Run watershed.

Currently preserved lands within the Winters Run Watershed, upstream of the Bel Air Intake are illustrated on Figure 13. These constitute about 1.8 square miles, or about 5% of the watershed serving Bel Air’s water supply.

Section 5

Recommendations for Source Water Protection

This section addresses existing provisions in place to protect Bel Air’s water supply, and provide recommendations for additional, improved or revised items. As noted in the town’s Comprehensive Plan (Bel Air Planning Commission, 2009), “the town’s drinking water service is drawn from Winters Run but only a fraction of the Winters Run watershed falls within the town’s boundaries. It is therefore imperative that the town work closely with the Harford County Government to protect water quality by managing future growth in the watershed.” This reality is reiterated below, where appropriate.

5.1 Contamination Contingency Plan

The number of point sources identified within the SWAAs for the Bel Air PWS are limited, and thus the potential for significant contaminant releases from identified point sources is also limited. Nonetheless, major roads such as US-1 do traverse these areas, and the potential for surface releases within the Winters Run watershed is significant, if only because of its size (36 square miles). Consequently, it is important that Bel Air maintain appropriate contingency planning for addressing unexpected releases of contaminants that might impact water supplies.

Per federal and state law, facilities that store more than 1,320 gallons of oil or petroleum-based liquids aboveground or more than 42,000 gallons of oil underground, and which could impact navigable waters, are required to have a SPCC (Spill Prevention, Control, and Countermeasure Plan). A SPCC Plan identifies practices related to the storage and management of oil and oil tanks, and response procedures in the event of a spill. It is recommended that town obtain copies of these for PCSs within the SWAA.

It is also recommended that the town and MAWC periodically review and update their plan of action to initiate in the event that a spill occurs. This plan should include emergency contact lists, community notification, PCS background and mapping, anticipated emergencies and response plans, spill cleanup resources and post-release monitoring. This plan should identify the key personnel responsible for emergency management and their specific responsibilities, the process and personnel responsible for communicating the issues to the affected public, and evaluate the need for alternate water supplies or treatment needs should one or more water source become contaminated.

5.1.1 General Contents

Currently, Harford County maintains an Emergency Operations Plan and an Emergency Operations Center to control and coordinate the County's response to major emergencies and disasters. Many elements of this plan are applicable to potential surface spills of contaminants. At the current time, Bel Air relies on the Harford County response to all incidents related to hazardous materials via 911 (R. Robertson, pers. Communication. 2013). Non-hazardous materials incidents are addressed by the town.

It is recommended that the town of Bel Air and MAWC maintain an Contamination Contingency Plan that defines the actions to be taken, 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 may assume an all-hazard approach to emergency planning, and address the general functions that need to be addressed during any emergency. It should be 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.

Recommended Designations for addressing incidents relative to this SWPP are:

Type of Incident	Designated Department
Hazardous Material	Harford County Dept. of Emergency Services
Pipeline Spill / Fire or Explosion	Harford County Dept. of Emergency Services
Water distribution / Water Quality	town of Bel Air / MAWC

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 Harford County Dept. of Emergency Services. The longer-term, potential threats to drinking water supplies are appropriately addressed by the town, including maintenance of water and sewer infrastructure, and ensuring the continued supply of potable water.

It is recommended that the town’s Water Supply Contamination Contingency Plan include the following items:

5.1.2 Emergency Contact Lists

- Harford County Dept. of Emergency Services (Fire, flood, building collapse, train derailment, pipeline spill/release, hazardous material release [including gasoline or other substances stored in tanks])
- Bel Air Volunteer Fire Company (backup to Harford County)
- Director of Public Works (responsible for overseeing water supply and water quality)
- Town Administrator (responsible for communicating with public)
- Maryland American Water Company

5.1.3 Known PCS and Associated Chemicals

- Figure 12 and Table 8 from this report, and similar figures, as updated in future Source Water Protection Plans

5.1.4 Contamination Response Resources

- Town Administrator (responsible for overseeing water supply and water quality)
- Town Engineering / Water Supply Consultants (for expert assistance)

- Harford County Department of Public Works (expert assistance on water quality evaluation)
- Maryland American Water Company

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

- Electronic signs in public areas, and
- Media releases (newspaper)

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 about a 6-hour supply of water.

Maryland American Water Company also maintains an interconnection with Harford County's water supply which can be tapped in case of emergency, if water is available at the time from the County's water system.

5.2 Town Zoning and Water System Management

The following sections address issues related to land development, planning, and zoning.

5.2.1 Wellhead Protection Ordinance

The Bel Air Comprehensive Plan includes an implementation summary (Appendix D) that incorporates a number of proposed actions for improving water quality. Regulatory options listed include a source water protection ordinance, stormwater ordinance, and development regulations. It is our recommendation that all these options, including a source water protection ordinance be fully evaluated.

Harford County has included Water Source Protection Districts in the County Zoning Code to protect community and nontransient water systems. Because only a fraction of the Winters Run watershed lies within town limits, Bel Air should continue to coordinate efforts with Harford County to provide for regulatory protection for portions of the watershed leading to the surface water intake. Specifically, these efforts should consider the implementation of zoning restrictions such as impervious surface limitations, lot coverage thresholds, increased stormwater regulations, natural resource buffer protections, and similar regulatory items that will effectively help to protect the drainage areas leading to the surface water intake.

The town can, however, also take action protect wellhead zones within the town boundaries, particularly as new development is possible for the regional around the Bynum Well SWAA (Figure 11). A wellhead protection ordinance (WHPO) could include specific items such as:

- Permitted and prohibited land uses (to address specific chemical hazards)
- Use of Best Management Practices (BMPs) for management of surface water and potential contaminants
- Restrictions on impermeable surfaces (to enhance recharge)

The Maryland Model Wellhead Protection Ordinance (MDE, 2007) provides a framework for developing site-specific wellhead protection ordinances. Appendix A provides an example of this WHPO, as modified for the town of Bel Air, and specific to the SWAAs developed for this report and its future revisions.

It is recommended that a WHPO be adopted in concert with the updated Master Plan to be completed in 2015. This will allow integration of the WHPO with other ongoing efforts, including County-based surface water protections for the Winters Run watershed.

5.2.2 Digital Information/Mapping Resources

The town should continue to develop mapping and Geographic Information Systems (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 defined here 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, the town should maintain hard copy maps that depict the boundaries of the SWAAs, PCS, critical infrastructure, emergency transportation options, and areas of high vulnerability.

It is also recommended that updated Bel Air SWAAs be provided to Harford County on a timely basis for incorporation into the County Planning GIS system.

5.3 Source Water Assessment Areas and Source Water Protection Planning

It is recommended that the town update the delineation of SWAAs, complete a new inventory of Potential Contaminant Sources, and perform a new Susceptibility Analysis at regular intervals. A six year interval is sufficient to account for identifying new trends in groundwater monitoring data, zoning and land use. It will be appropriate to time updates to coincide with revisions to the town Comprehensive Plan. 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, the Department of Public Works and the Department of Planning should work together to implement the recommendations of the most current SWPP, including prohibited and permitted land uses within each SWAA.

Coincident with this review of water supply susceptibility, the town of Bel Air should continue to review the WHPO regulations approximately every five years. This will provide the town with the opportunity to adjust items such as the prohibited land uses, update regulations to incorporate new management practices, and help to ensure that the WHPO regulations remain viable to implement.

5.4 Public / Governmental Interaction

It is recommended that the town of Bel Air enter into an agreement with Harford County, MWAC, and MDE to explicitly detail the responsibilities of each party with regard to wellhead protection, water supply, water quality monitoring, remediation, and similar activities both inside and outside of the Winters Run watershed. This agreement should include the establishment of biannual meetings between the parties. This meeting will be used to discuss issues ranging from newly submitted groundwater withdrawal applications, current monitoring efforts and results, enforcement and remediation efforts, regulatory changes, and significant development proposals.

The current Comprehensive Planning Document (Bel Air Planning Commission, 2009) notes that [in regard to water supply]“... it has been suggested that representatives of the town, County, Maryland American Water Company, Maryland Department of the Environment and Bel Air Volunteer Fire Company meet quarterly to discuss water related issues.” Thus this recommendation is consistent with previously recognized needs. This approach also is consistent with a strategy in Harford County’s Natural Resources Element Plan, the Water Resources section, which states: “Form a planning team with the town of Bel Air to develop additional protection strategies for the Winters Run watershed draining to the Maryland American Treatment Plant.”

5.4.1 Source Water Protection Board

It is also recommended that interested members of the public be invited to participate and observe these meetings to enhance public knowledge and involvement in water planning activities. This stakeholder’s committee may be established as “Source Water Protection Board” by the town administrator.

5.5 Public Awareness and Outreach

It is recommended that the Town Council and/or Administrator appoint an individual or agency to be responsible for communicating the importance of groundwater protection amongst the citizens and business interests of the town.

5.5.1 Development of Outreach Strategy

The individual or agency identified above should develop 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. The majority of the Winters Run Watershed is in agricultural use, therefore promoting soil conservation practices such as cover cropping, no till agriculture and rotational grazing could greatly improve water infiltration capacity and reduce erosion and turbidity.

Outreach 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.

While the target of this outreach may be Winters Run watershed residents outside the town limits, benefits regarding water quality will accrue to the town.

5.5.2 Develop Signage for the Recharge Zones

It is recommended that the town of Bel Air develop signage that indicates what areas are located in the Recharge Zones or Winters Run watershed. 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 recharge area and provide contact information which can help people to report spills.

Possible locations to address the Bynum Run well include along Route 22, and in the downtown Bel Air parks near Bynum Run. Possible locations to address the edge of the Winters Run watershed (within town boundaries) include along Route 24, near the intersection with Route 1.

5.6 Land Acquisition and Easements

5.6.1 Acquisition of Land

It is recommended that the town of Bel Air, in conjunction with Harford County and/or state agencies, pursue the acquisition of additional lands within the SWAAs and/or watersheds of concern. The return on investment for these sources will 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. Priority rankings for potential acquisition targets should be developed that focus on maximizing the return on investment. The ranking guidelines should include factors that correspond to that parcels relative impact on water quality protection. Specifically, this ranking procedure should include the relative presence or absence of natural resources (streams, wetlands), the proximity of the parcel to high recharge areas, the amount of preservable land versus developed land on the parcel, zoning, potential for development and other factors local administrators wish to include.

5.6.2 Creation of Easements

The town should strive to create additional conservation easements on parcels that offer opportunities to improve water quality, particularly within Winters Run. See section on Agricultural Land Preservation (above).

5.7 Funding Opportunities

It is recommended that the town pursue various opportunities to acquire funding sources for these efforts. Various grants and loan programs are available at the local, state, and federal level that are targeted towards water preservation issues. These funding sources often include administrative funds that can provide a means of hiring dedicated staff for the implementation of these programs, or that can be combined with general government funding to offset the total costs to local government. Table 11 provides information pertaining to some of the more

common funding opportunities and contact information by which additional application information can be obtained.

5.8 Implementation Schedule

Table 12 is a matrix summarizing the results of this report. It includes a listing of possible threats to water quality and supply, recommended actions, together with estimated costs, sources of funding, and schedule. Some potential costs and schedules are poorly defined at this time, and dependent upon further town action. These are noted as “TBD” in the table.

Section 6

Conclusions and Summary

The Source Water Assessment for Bel Air'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 for bedrock wells – these total about 727 acres for the Bynum Run and Winters Run wells. The SWAA for the Winters Run surface water intake represents the entire watershed upstream of the intake, an area of about 36 square miles.

The susceptibility analysis for the Bel Air PWS finds that all of the groundwater and surface water sources are potentially susceptible to surface contamination, including VOCs, IOCs, and SOCs. Groundwater quality data from recent years, however, does not illustrate any specific concerns regarding these classes of compounds exceeding regulatory levels or ½ of regulatory levels. While TTHMs have exceeded one-half the current drinking water standard in a significant number of samples, water from the Bel Air system as not exceeded regulatory levels on an annual level. In addition, TTHM levels have generally decreased to less than ½ the MCL in recent years.

The majority of Bel Air's water supply is obtained from Winters Run, which is largely outside the boundaries of the town, within Harford County jurisdiction. Nonetheless, the town is capable of taking some useful actions by itself and in coordination with the County and State. Recommendations to the town of Bel Air include the following:

- Developing of an Contamination Contingency Plan that clearly outlines responsibilities and contact information
- Development of a Source Water Protection Ordinance, including delineation of prohibited land uses within 500 feet of each wellhead (Zone 1) – an example WHPO has been included
- Continuing to maintain and improve Digital Information/Mapping Resources, including incorporation of SWAAs in the town and County GIS systems
- Periodic updates to the Source Water Assessment Areas and Source Water Protection Planning
- Public / Governmental Interaction to be accomplished through a Source Water Protection Board
 - 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 and creation of easements to further protect recharge areas

Section 7

References

- Bel Air Planning Commission. 2009. 2009-2015 Comprehensive Plan - town of Bel Air, Maryland. March. 235.
- Harford County Maryland. 2009. Harford County Natural Resources Element Plan.
- Harford County Department of Planning and Zoning. 2013. Harford County, Maryland Zoning Code. Part 1. Standards. Chapter 267-66. Water Source Protection Districts.
- Maryland Department of the Environment Water Supply Program. 1999. Maryland's Source Water Assessment Plan. January 29, 1999.
- Maryland Department of the Environment. 2005. Source Water Assessment for the Maryland American - Bel Air Water System. March. 55.
- Maryland Department of Environment, Water Management Administration. 2007. Maryland Model Wellhead Protection Ordinance, Second Revision. Baltimore. February. 21.
- Maryland Department of the Environment. 2008. Cleanup Standards for Soil and Groundwater. June.
- Reger, James P., and Emery T. Cleaves. 2008. Explanatory Text for the Physiographic Map of Maryland. Open-File Report 08-0301. Maryland Geological Survey.

FIGURES

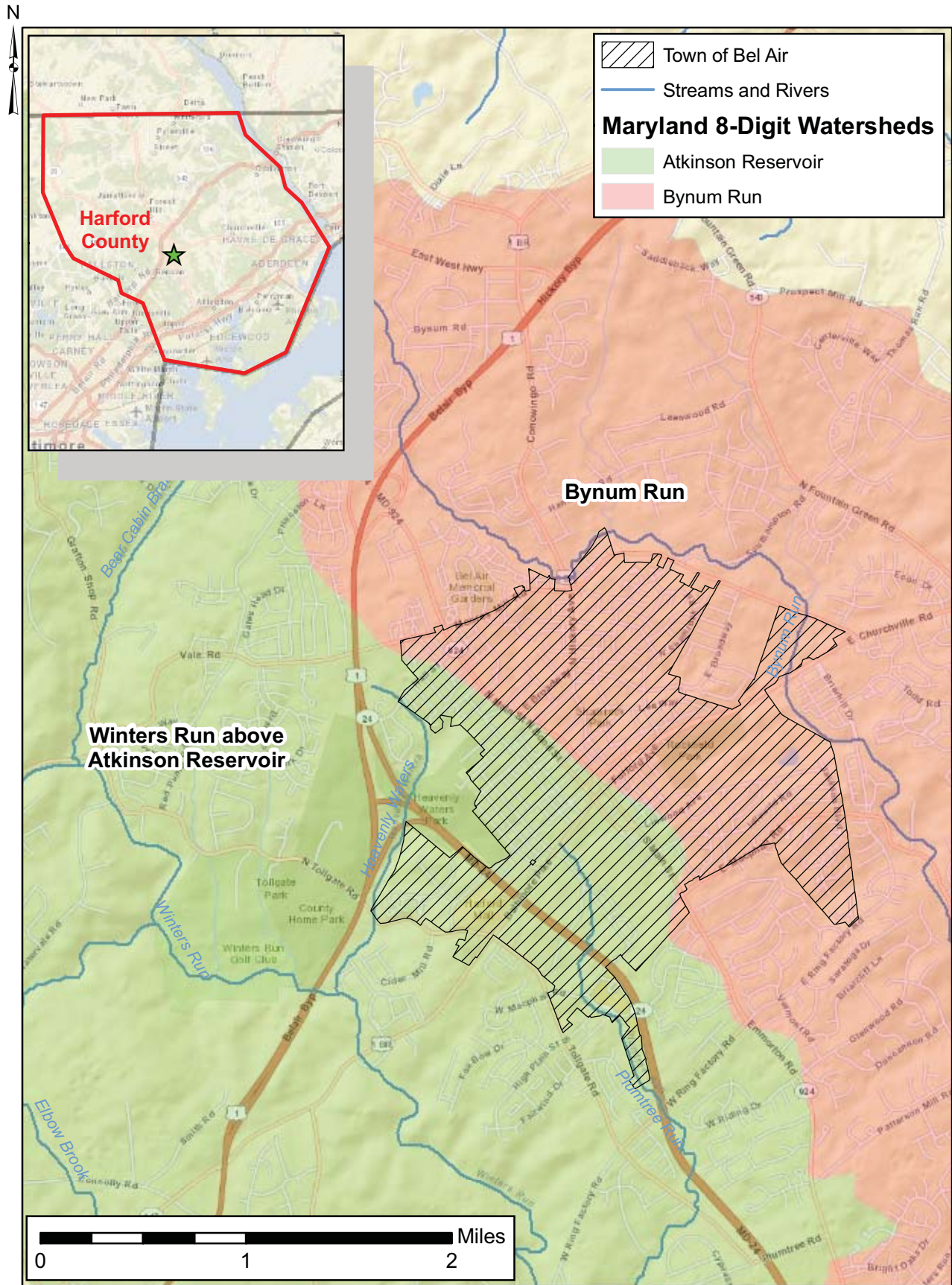


Figure 1 Location of Bel Air, MD

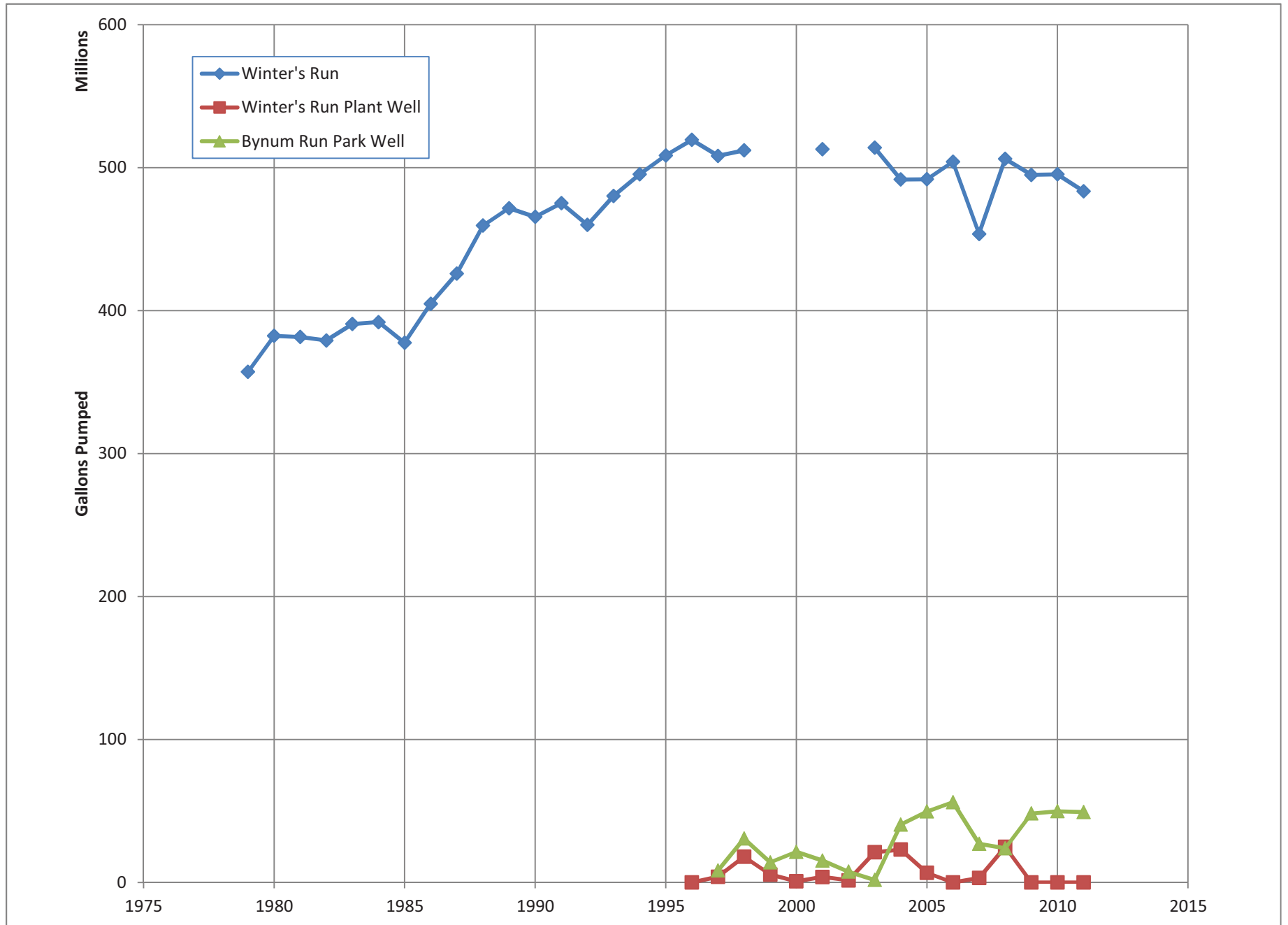


Figure 2 Reported Water Use by Maryland American Water Company for the Town of Bel Air, 1979 to 2011

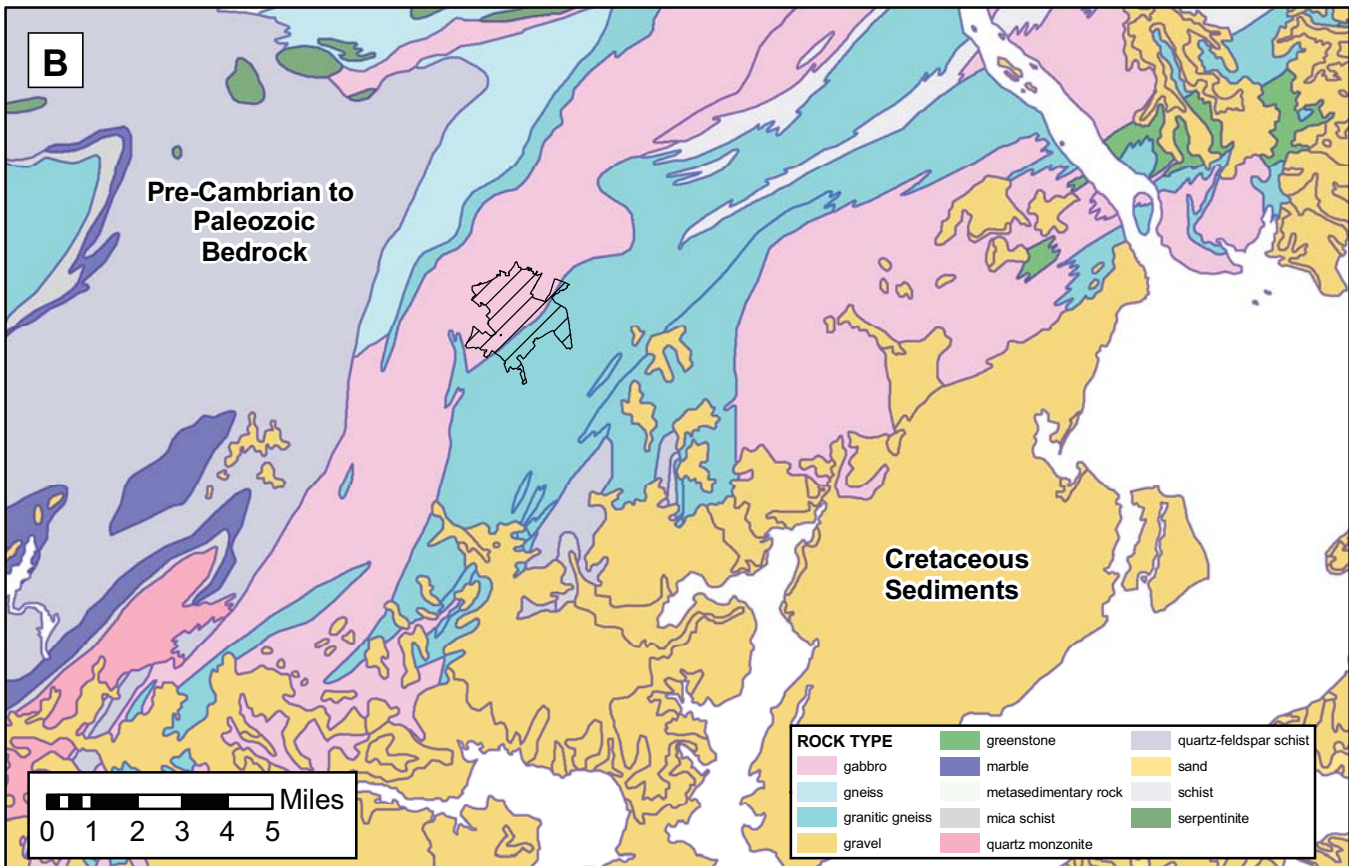
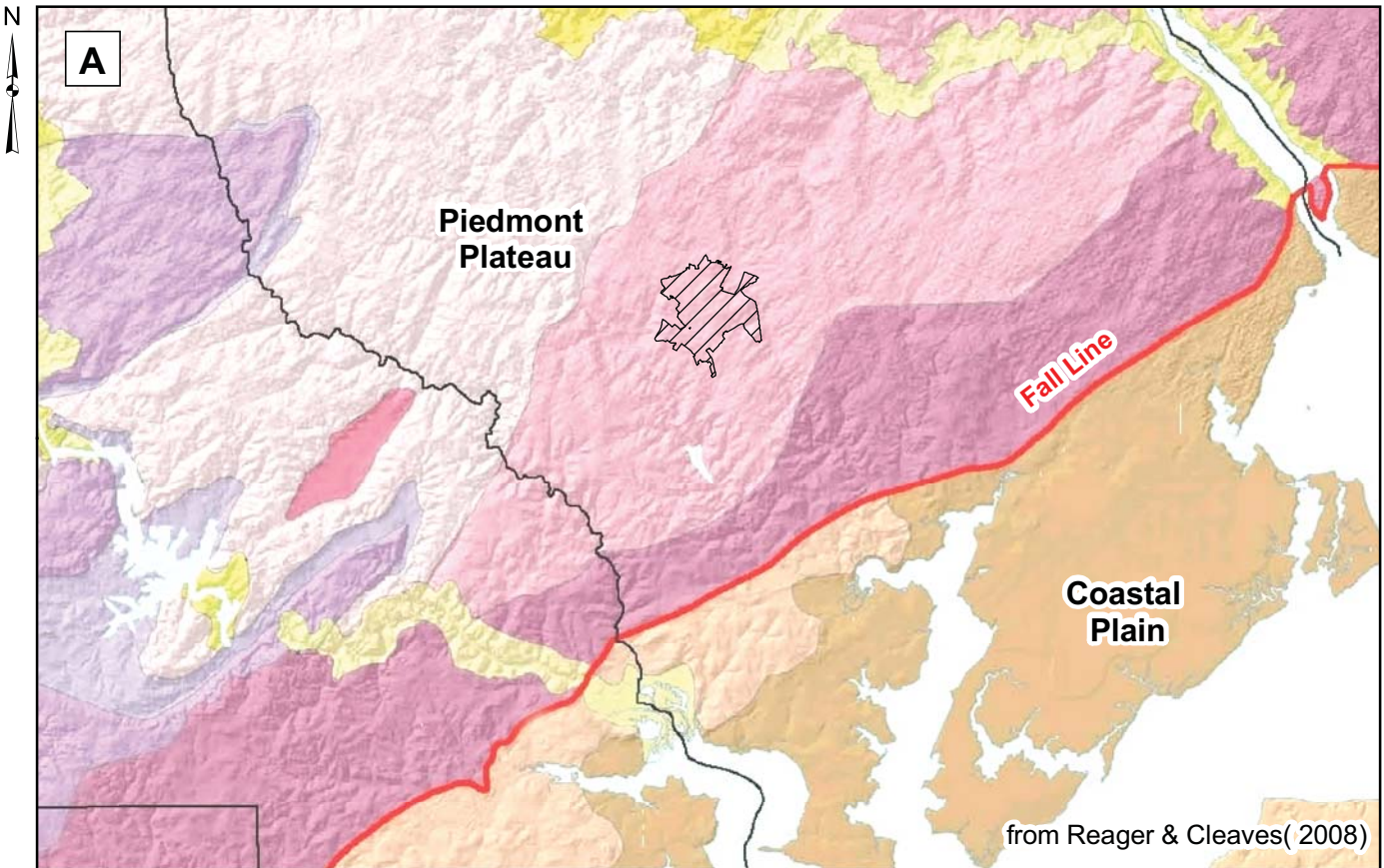


Figure 3 Physiographic Provinces of Maryland (A) and Bedrock Geology (B) in vicinity of Bel Air, MD

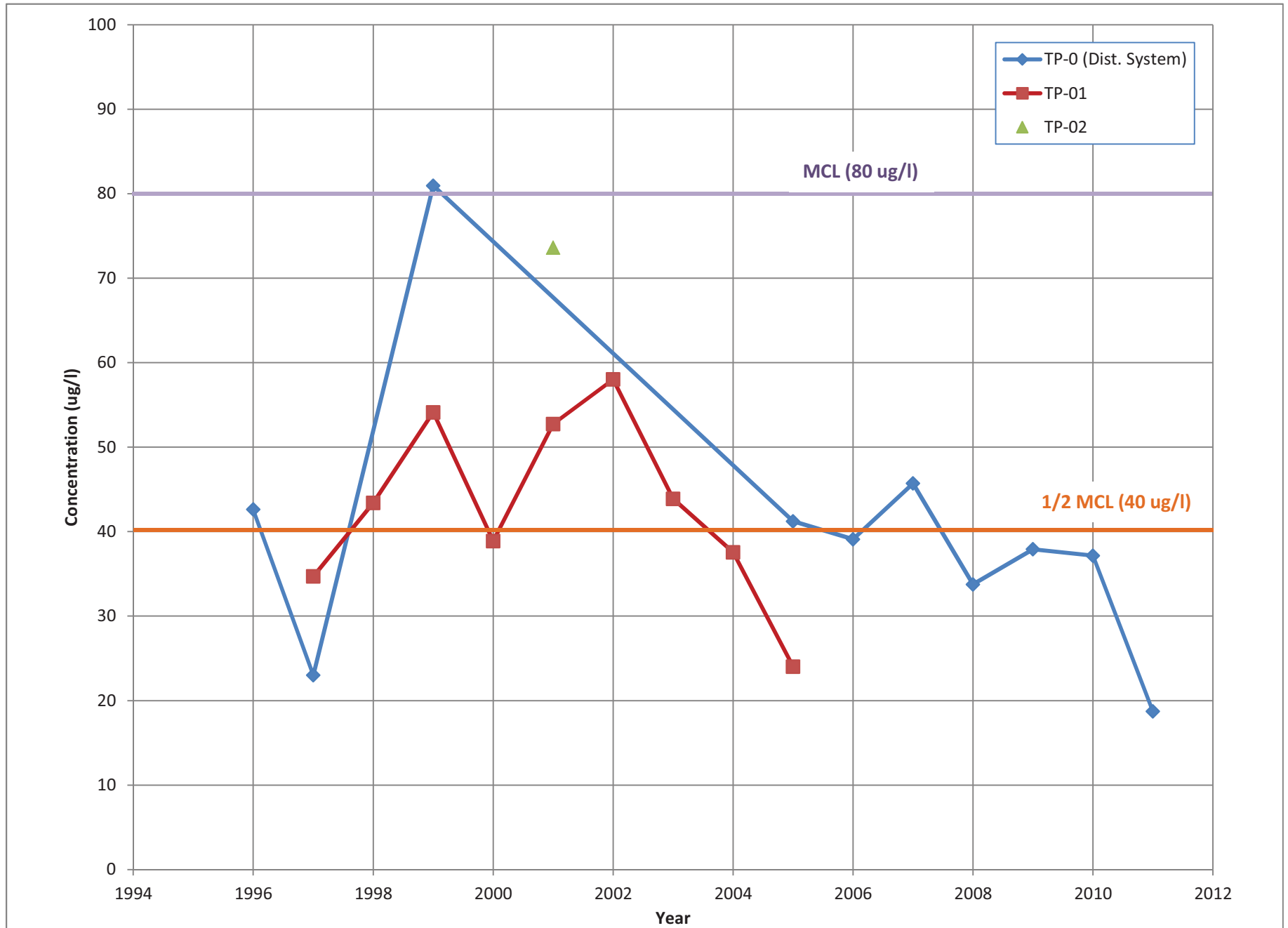


Figure 4 Annual Average TTHM Values for the Bel Air PWS

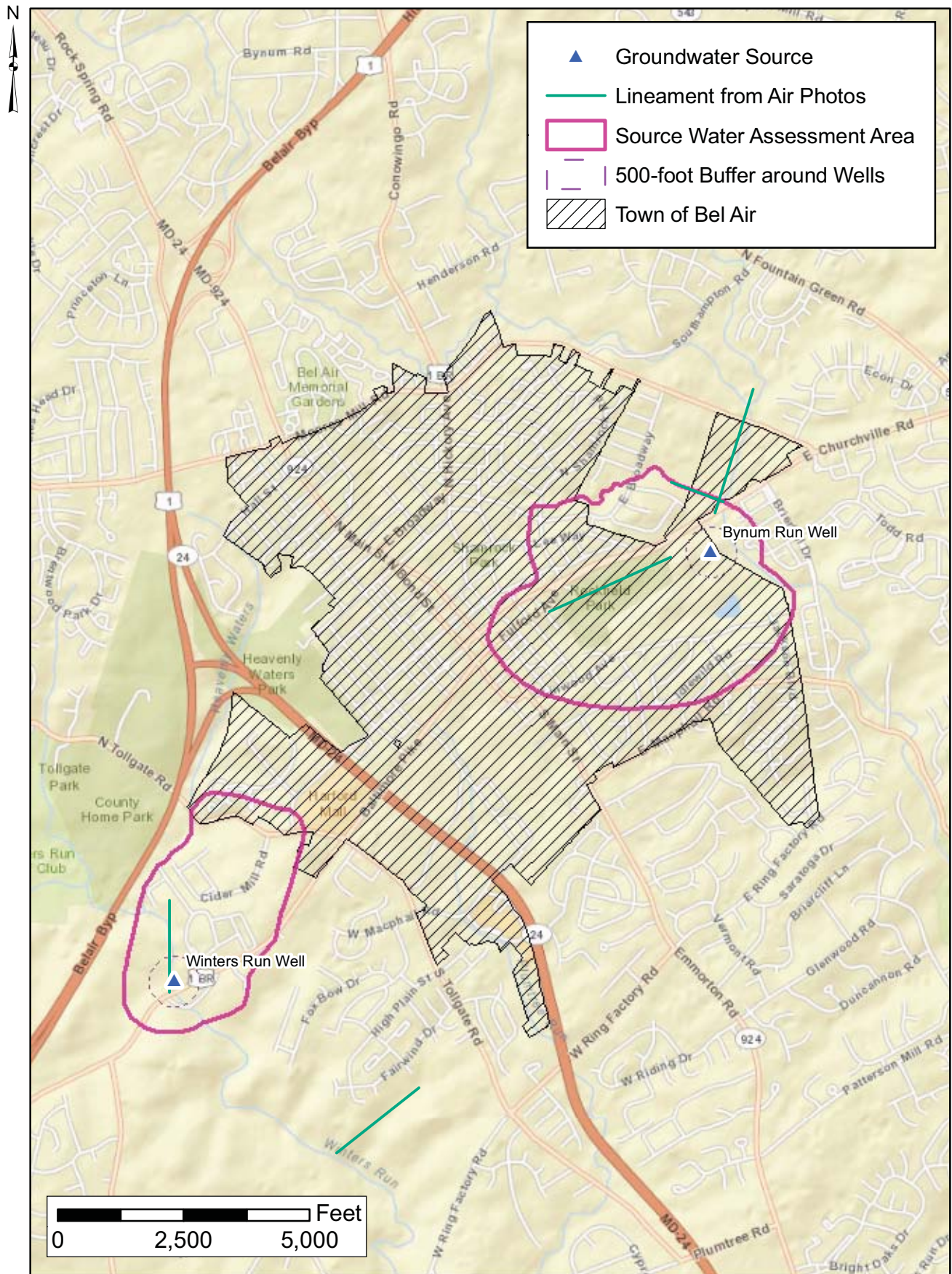


Figure 5 Source Water Assessment Areas (SWAAs) for Maryland American Water System Wells

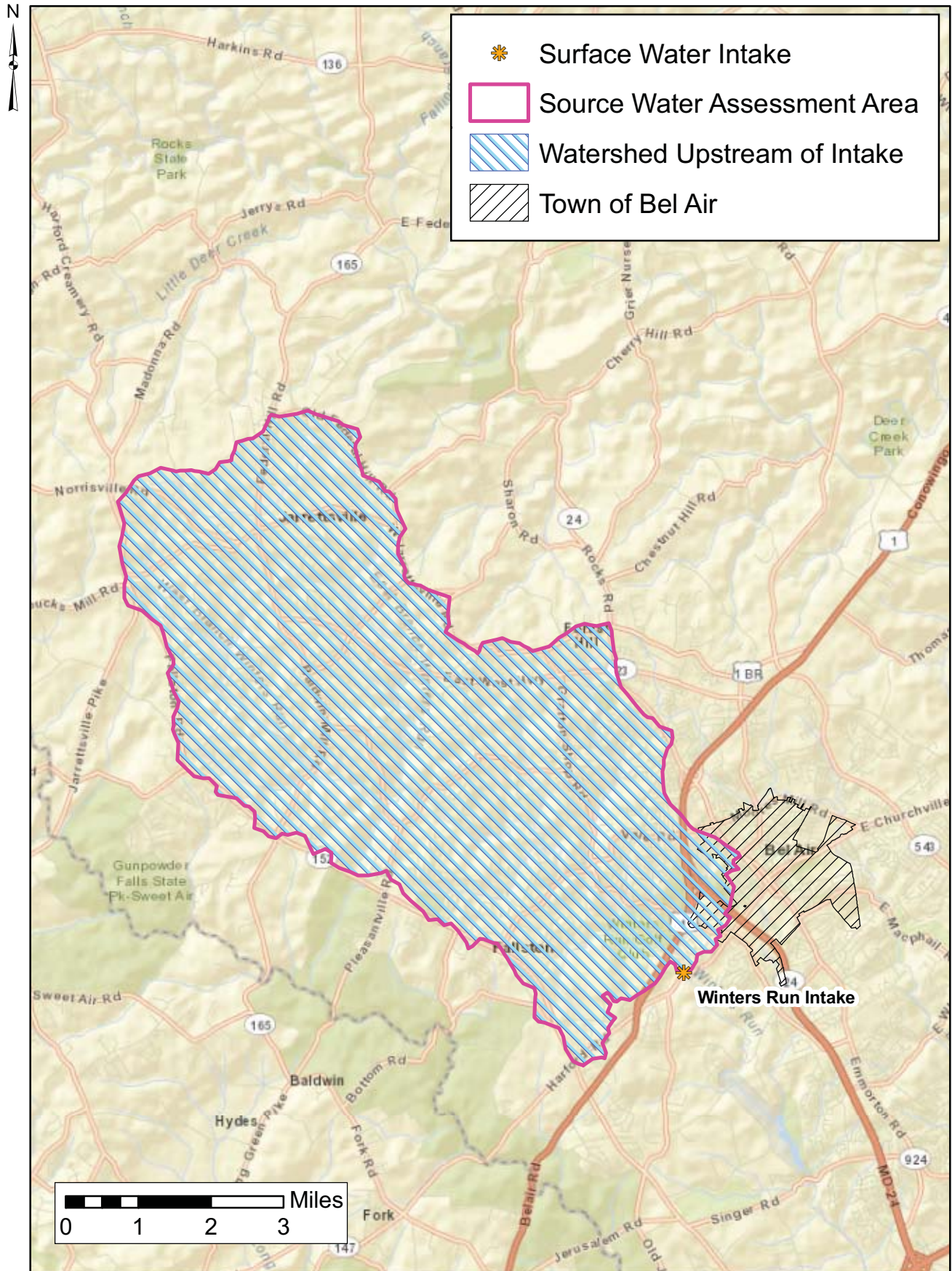


Figure 6 Source Water Assessment Area (SWAA) and Watershed for Maryland American Water System Surface Water Source

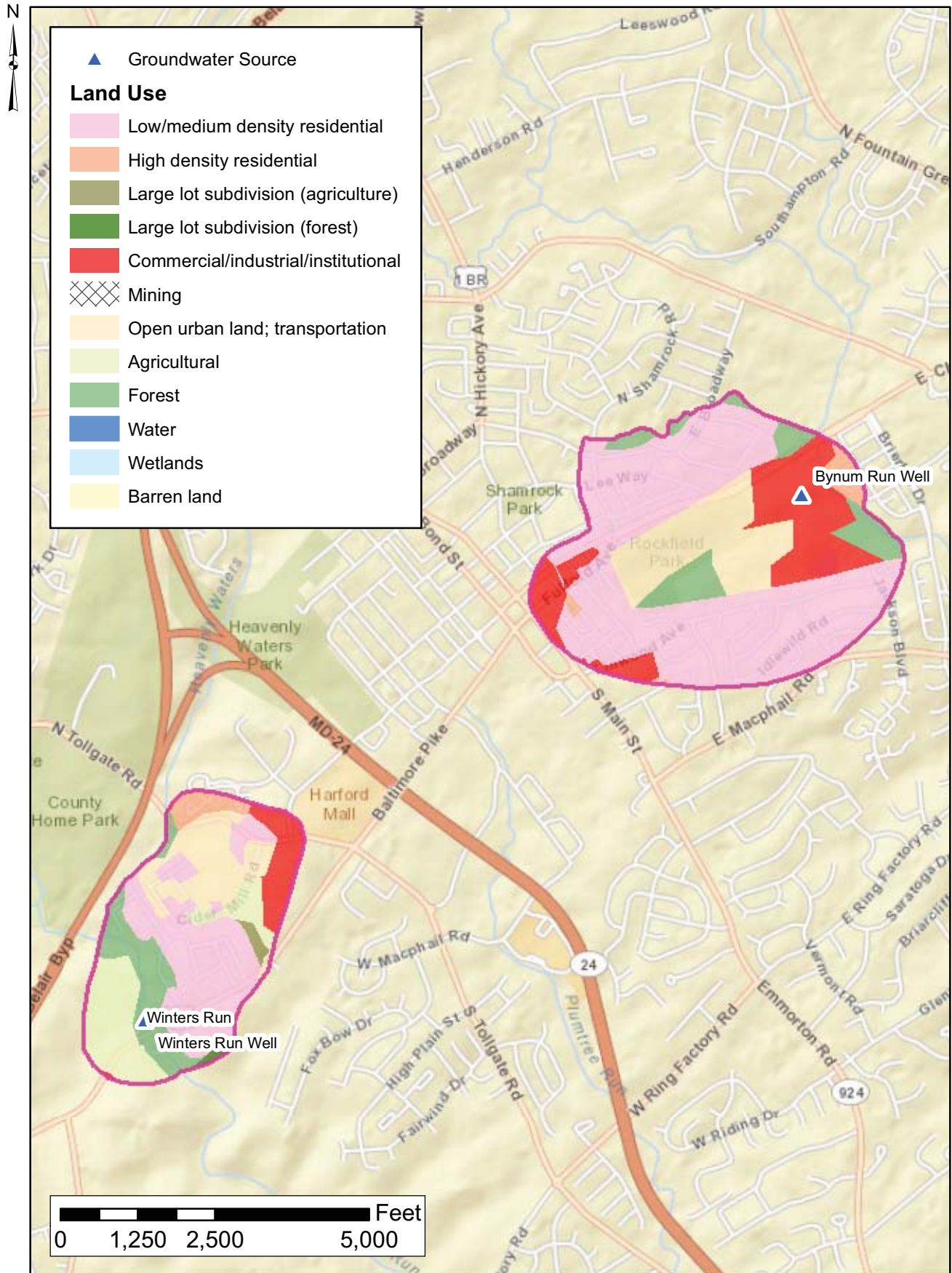


Figure 7 Land Use in the SWAAs for Wells in the Maryland American Water System

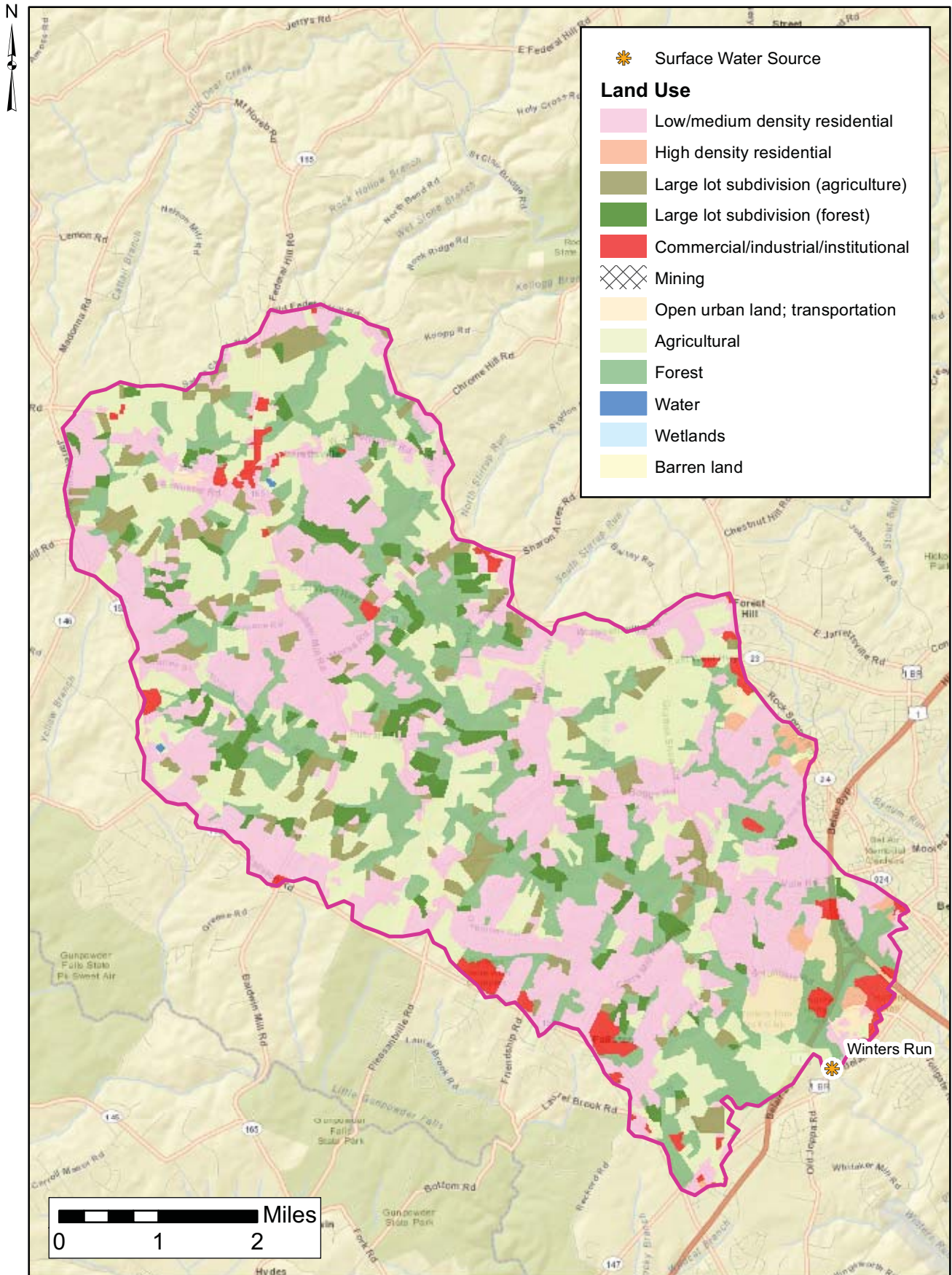


Figure 8 Land Use in the Watershed for the Winters Run Intake

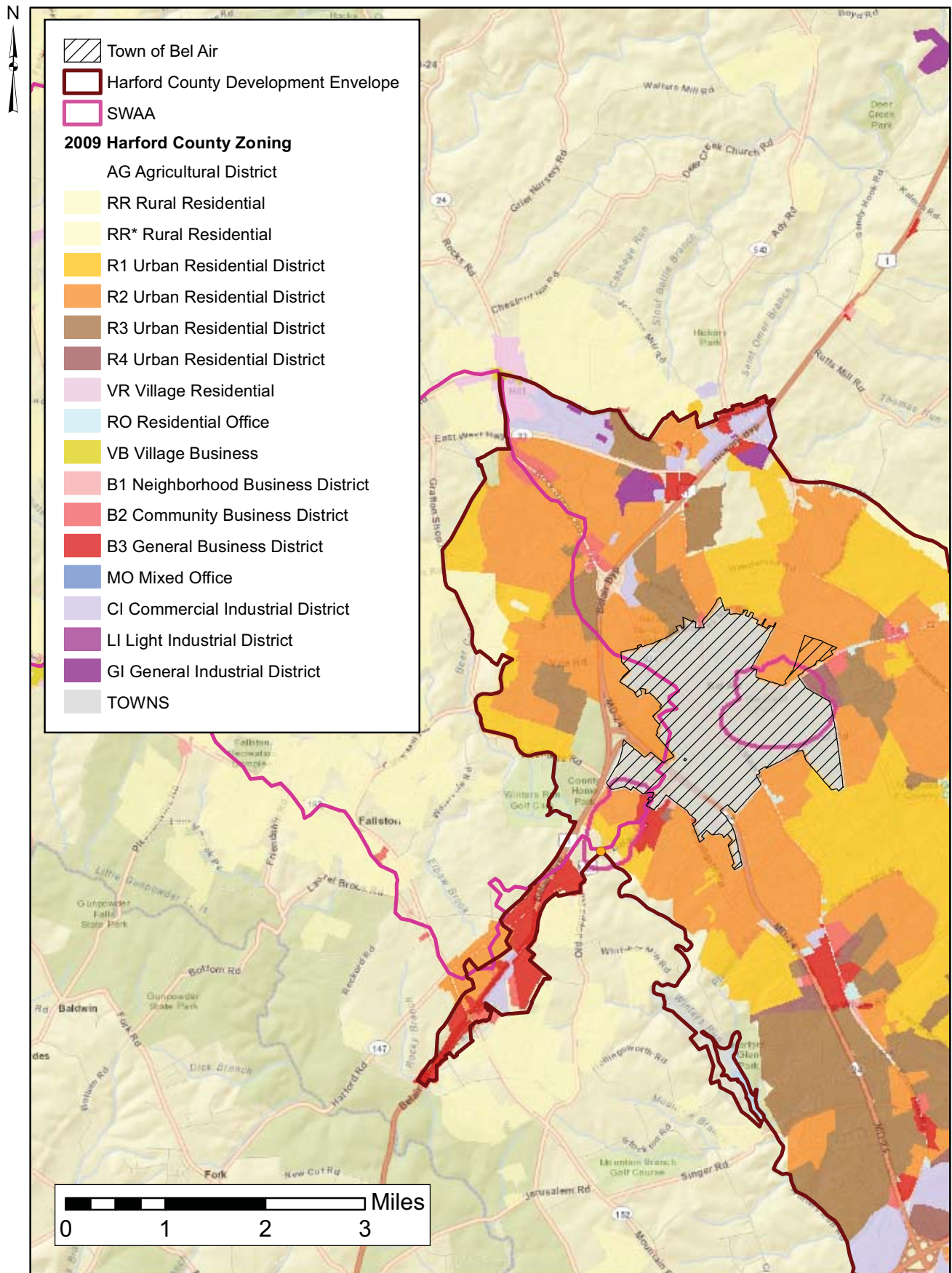


Figure 9 Zoning Designations (2009) for Harford County

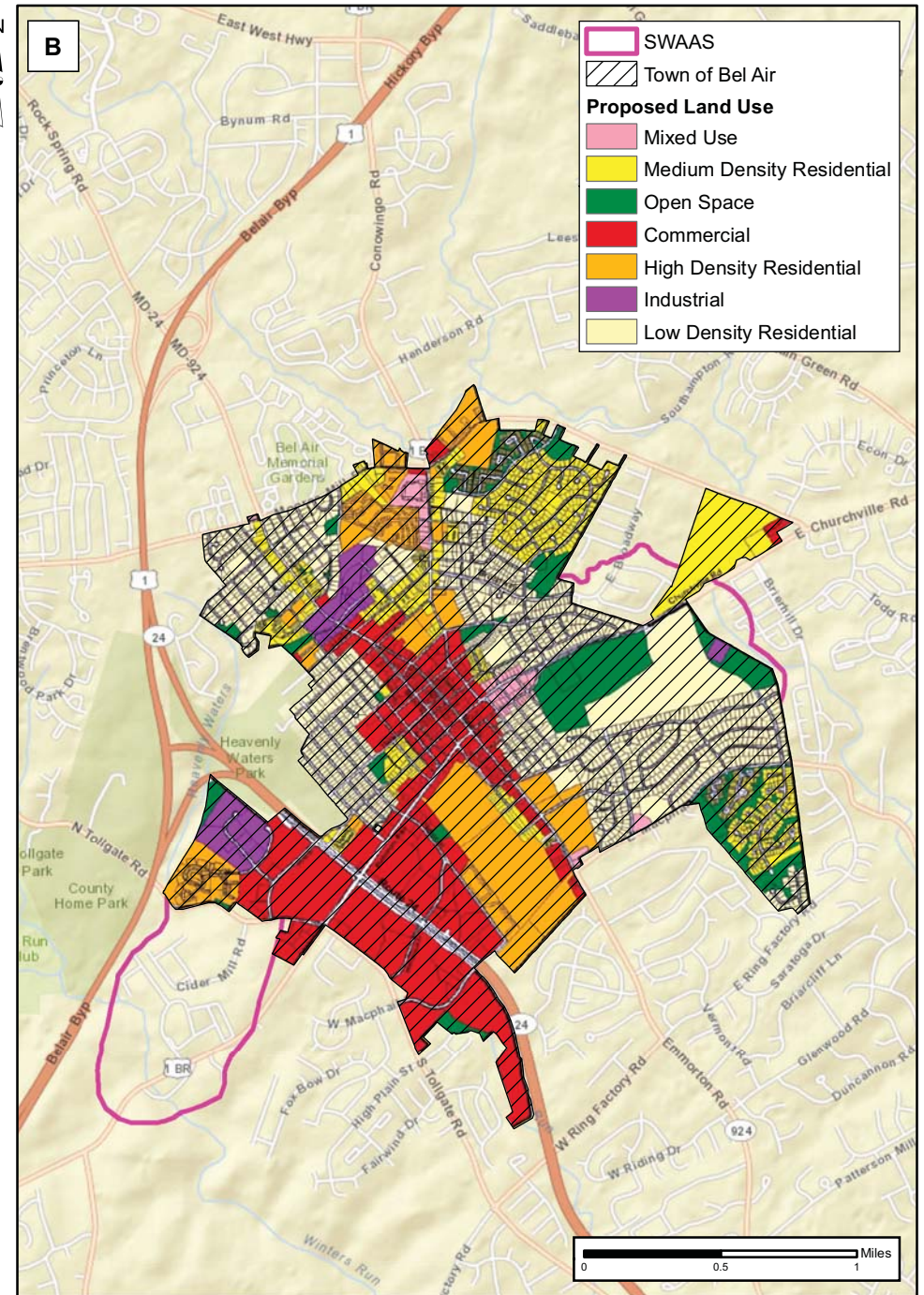
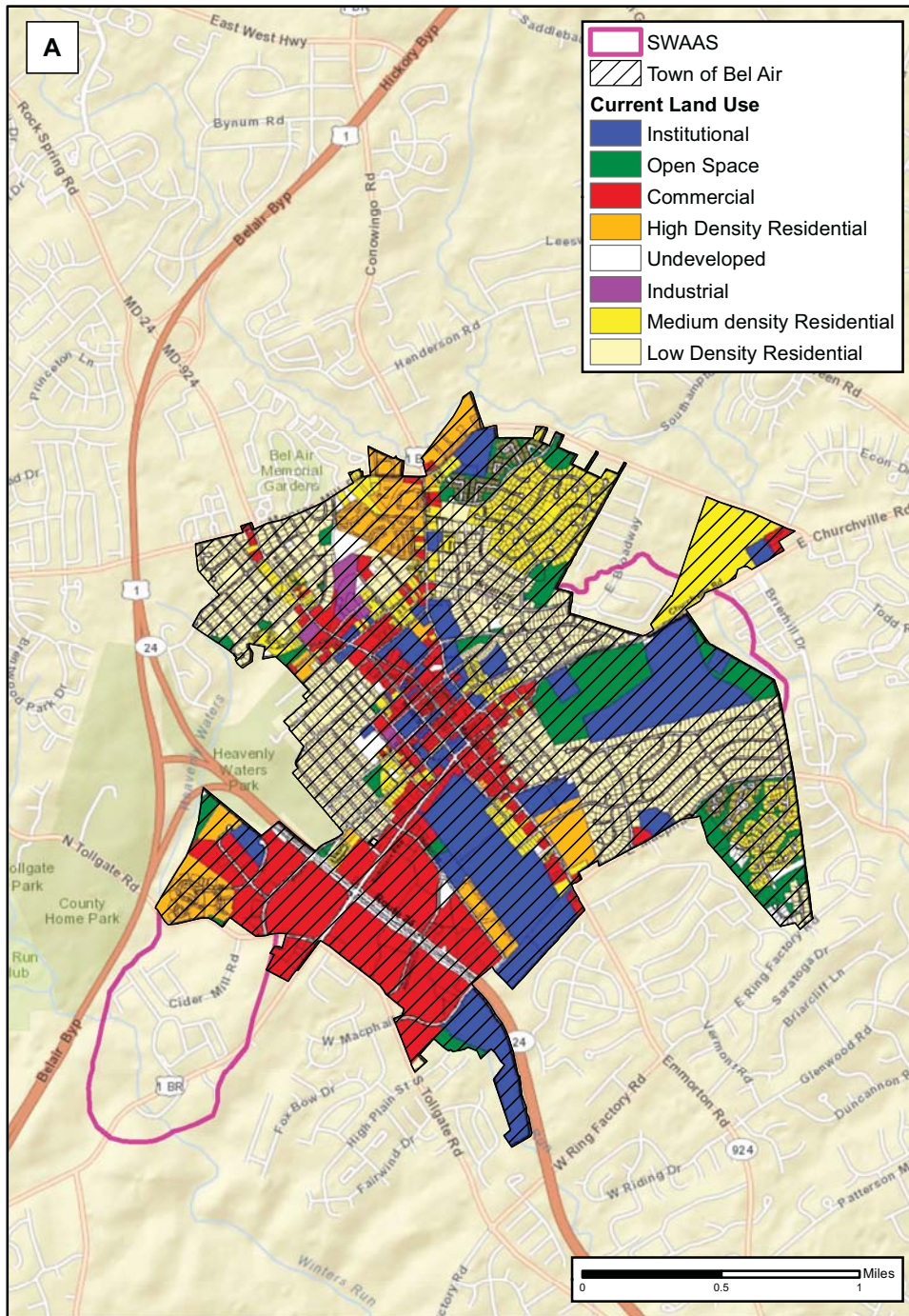


Figure 10 Current (A) and Proposed (B) LandUse from the Bel Air Comprehensive Plan

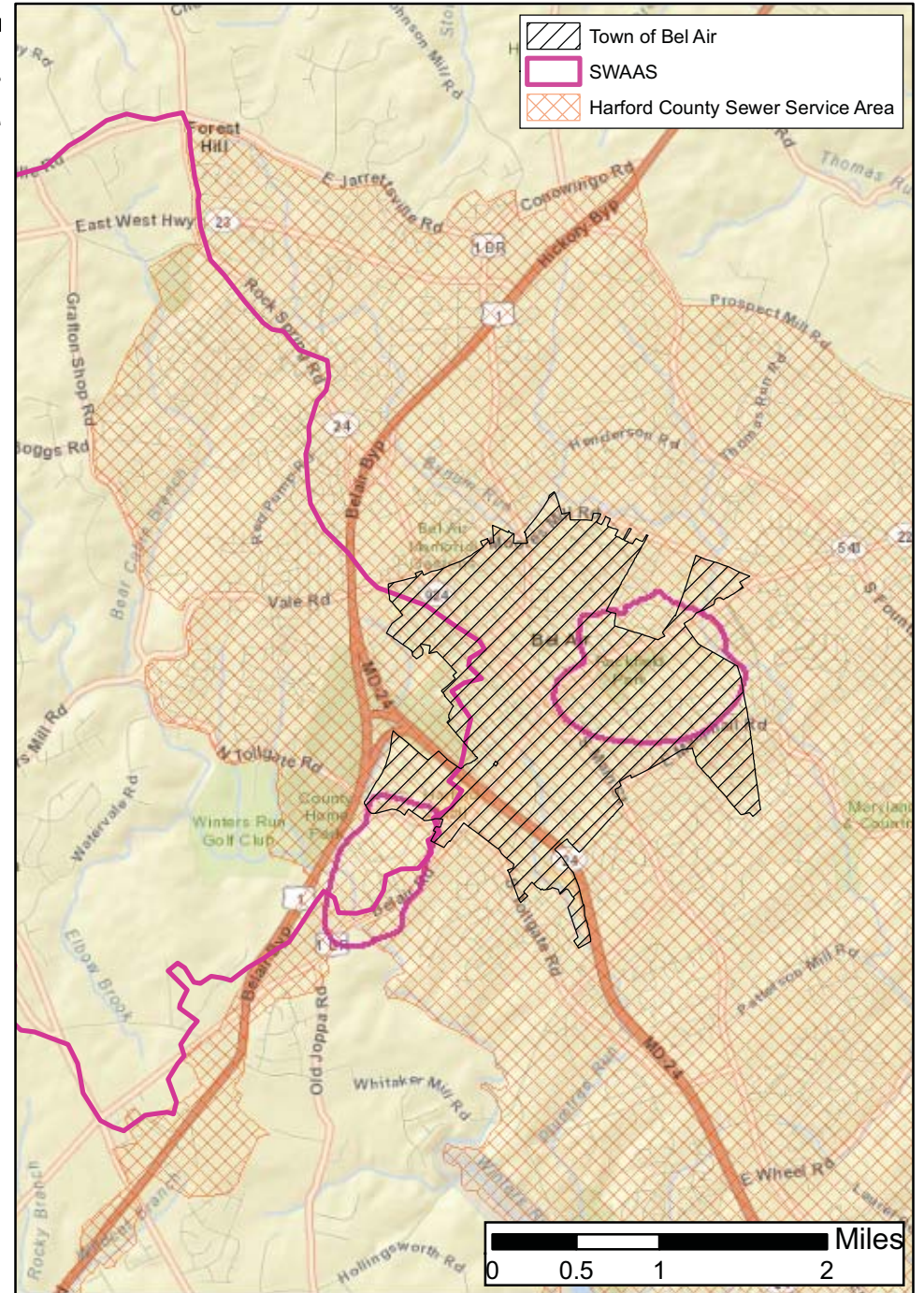
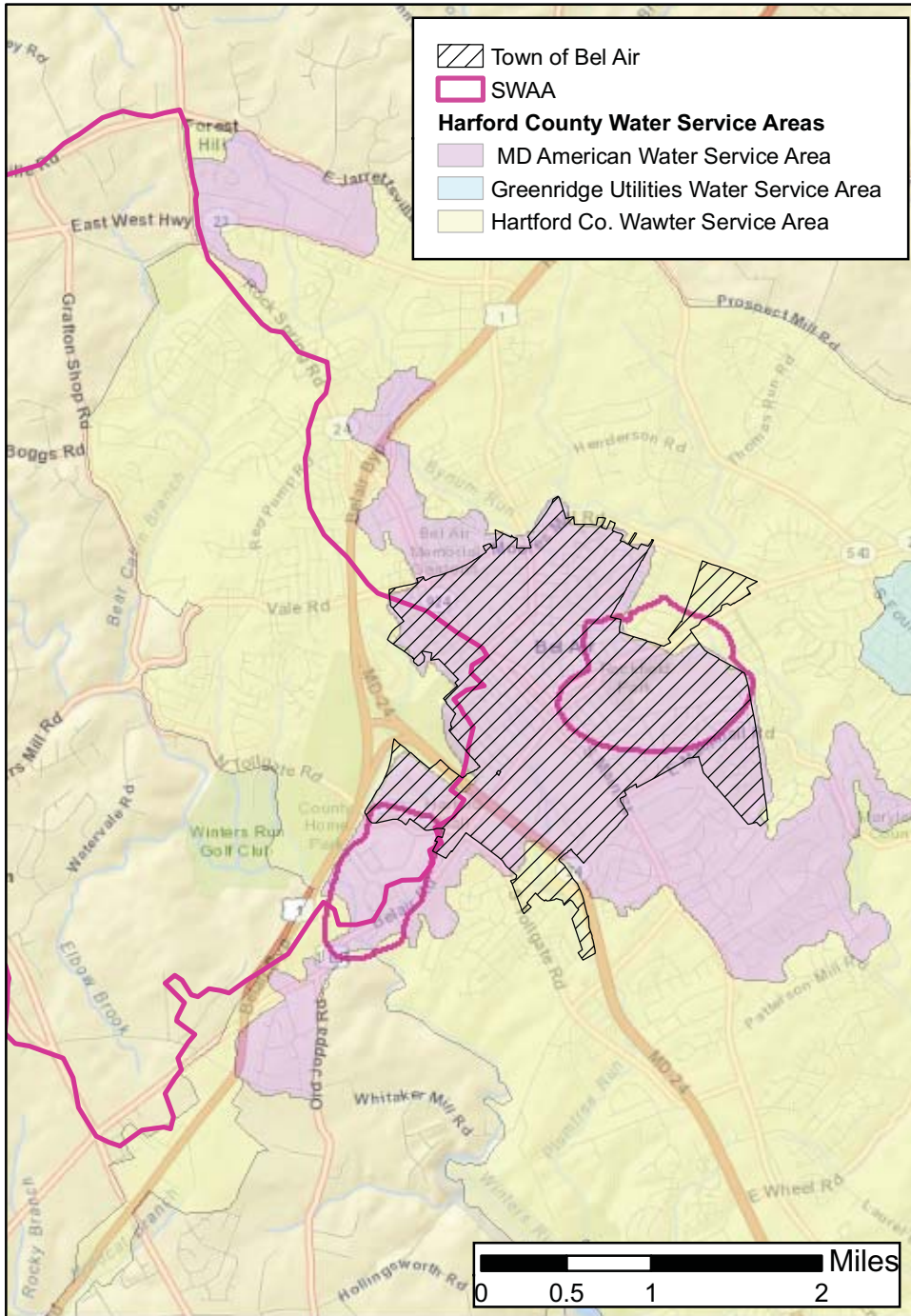


Figure 11 Water Service (A) and Sewer Service Areas (B) in the Vicinity of Bel Air

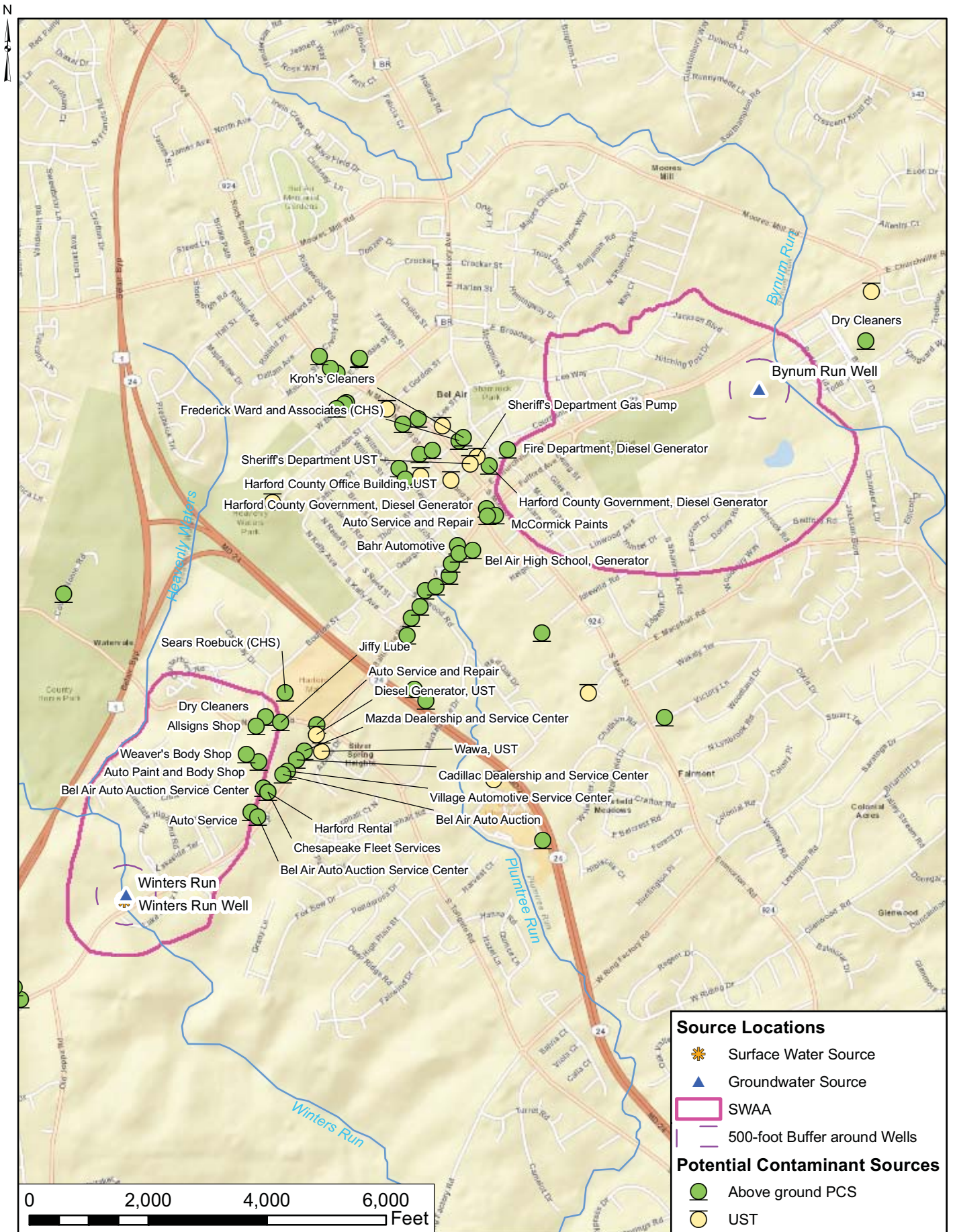


Figure 12 Potential Contaminant Sources in the Bel Air Area

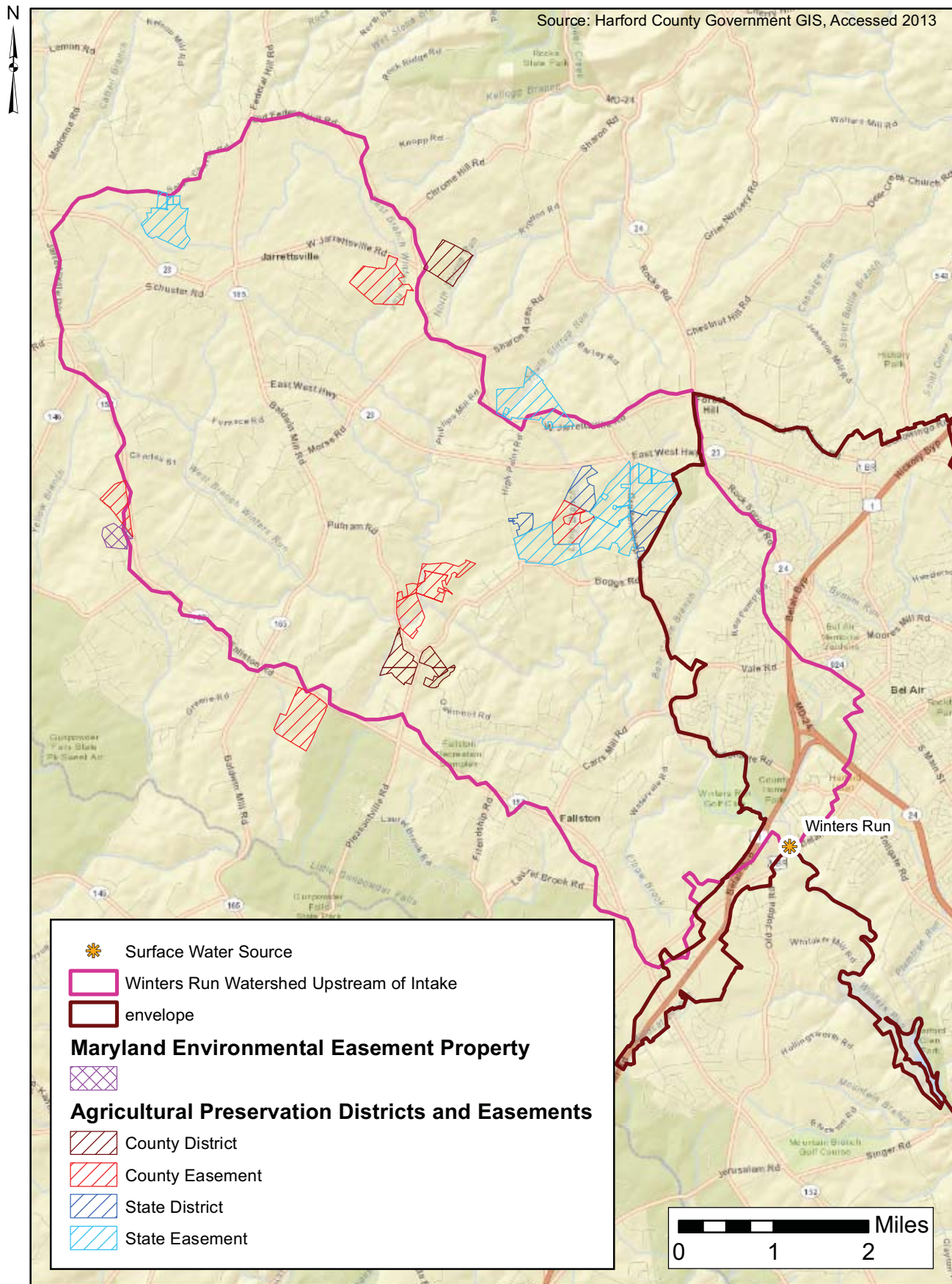


Figure 13 County and State Preserved Lands Upstream of the Winters Run Intake

TABLES

TABLE 1 Water Appropriation Permits for the Maryland American Bel Air Water System

	WAPID	Owner	Sources	AGPD	MGPD
1	HA1976S015	Maryland-American Water Company	Winters Run	1,400,000	1,700,000
2	HA1994G060	Maryland-American Water Company	Winters Run Plant Well	132,000	246,000
3	HA1996G022	Maryland-American Water Company	Bynam Run Park Well	230,000	271,000
	Total			1,762,000	

TABLE 2 Sources of the Maryland American Bel Air Water System

SOURCES ADDRESSED IN THIS REPORT												SOURCES IN 2005 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	01	1	Winters Run	---	HA1976S015	N/A	N/A	N/A		N/A	Yes
2	GW	03	1	Winters Run Plant Well	HA940142	HA1994G060	540	26	Feb-95		Port Deposit Gneiss	Yes
3	GW	02	2	Bynum Run Park Well	HA941107	HA1996G022	125	42	Jul-96		Port Deposit Gneiss	Yes

**TABLE 3 Volatile Organic Compounds (VOCs) and Total Trihalomethanes (TTHM)
Reported for the Maryland American 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)
Methyl-Tert-Butyl-Ether	2	2/12/2007	2/12/2007	28	2	0.9
Xylenes, Total	1	07/16/01	07/16/01	23	1	1.2

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	01/24/01	05/31/06	18	17	8.7
Bromodichloromethane	2	08/21/01	08/21/01	11	1	0.6
Chloroform	1	01/24/01	05/31/06	18	17	22.9
Chloroform	2	01/24/01	03/08/10	11	7	11.8
Dibromochloromethane	1	01/24/01	05/31/06	18	17	2.7
Dibromochloromethane	2	03/08/10	03/08/10	11	1	0.8

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	102	44	6
Total Trihalomethanes	1	71	58	16
Total Trihalomethanes	2	2	1	1

* 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)

Compliance with EPA standards is based upon the annual average of TTHM results - see Figure 4

TABLE 4 Synthetic Organic Compounds (SOCs) Reported in the Maryland American Water System

A. Detections

Contaminant	Plant ID	Earliest Detect Date	Most Recent Detect Date	Number of Analyses	Count of Detections	Max Concentration (ug/L)	MCL *
Atrazine	1	05/29/01	08/18/10	186	6	0.4	3
Dalapon	1	07/27/09	07/27/09	20	1	1.07	200
Dalapon	2	06/01/04	06/01/04	5	1	1.44	200
Decachlorobiphenyl	1	05/31/06	05/31/06	6	1	0.1	0.5
Di(2-Ethylhexyl) Phthalate	1	05/12/03	08/25/08	186	6	1.7	6
Di(2-Ethylhexyl) Phthalate	2	08/14/01	04/17/07	15	3	1.4	6
Metolachlor	1	04/17/07	04/17/07	17	1	0.6	
Pentachlorophenol	1	05/12/03	05/12/03	20	1	0.02	1

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

B. Exceedances

Contaminant	Plant ID	Number of Samples	Exceedances of One-Half MCL	Exceedances of MCL
Atrazine	1	216	---	---
Dalapon	1	25	---	---
Dalapon	2	25	---	---
Decachlorobiphenyl	1	8	---	---
Di(2-Ethylhexyl) Phthalate	1	216	---	---
Di(2-Ethylhexyl) Phthalate	2	108	---	---
Metolachlor	1	22	---	---
Pentachlorophenol	1	25	---	---

TABLE 5 Inorganic Compounds (IOCs) Reported in the Maryland American Water System

Contaminant	Numer of Detections	Earliest Detect Date	Most Recent Detect Date	Min Concentration	Max Concentration	MCL	SMCL	Units
Barium	18	03/13/01	02/23/11	0.002	0.041	2		mg/L
Fluoride	19	03/13/01	03/01/11	0.4	1.5	4	2	mg/L
Gross Alpha	3	07/18/01	12/13/01	0.5	1	15		pCi/L
Mercury	2	03/07/05	03/08/05	0.0002	0.0005	0.002		mg/L
Nickel	12	03/02/04	02/23/11	0.0007	0.0041	0.1		mg/L
Nitrate	26	03/14/01	03/09/11	2.16	4.1	10		mg/L
Nitrite	1	03/26/02	03/26/02	0.006	0.006	1		mg/L
Radium-228	3	06/13/05	08/16/06	0.138	0.833			pCi/L
Sodium	22	03/13/01	03/09/11	8	64			mg/L
Sulfate	11	03/13/01	03/14/07	7.4	27.5		250	mg/L

TABLE 6 Total and Fecal Coliform Results Reported for the Maryland American 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
1898	1	0	0	3	0	0	0

TABLE 7 Land Use in the Bel Air Area
A. Ground Water

Land Use	Acres			Percent of SWAA Acreage		
	Bynum Run Park Well	Winters Run Plant Well	Total	Bynum Run Park Well	Winters Run Plant Well	Total
Agricultural		50.9	50.9	0.0%	19.7%	7.0%
Commercial / Industrial / Institutional	83.5	21.5	105.0	17.8%	8.3%	14.4%
Forested	40.6	38.7	79.3	8.7%	15.0%	10.9%
High-Density Residential	11.1	10.1	21.3	2.4%	3.9%	2.9%
Large lot subdivision (agriculture)		2.9	2.9	0.0%	1.1%	0.4%
Large lot subdivision (forest)		1.7	1.7	0.0%	0.7%	0.2%
Low / Medium Density Residential	263.0	88.2	351.2	56.0%	34.1%	48.2%
Open Urban Land / Transportation	71.3	44.4	115.7	15.2%	17.2%	15.9%
Total Acres	469.5	258.5	728.0	100.0%	100.0%	100.0%

B. Surface Water

Land Use	Acres	Percent of SWAA Acreage
	Winters Run Intake	Winters Run Intake
Agricultural	6281.2	27.0%
Barren Land	4.6	0.0%
Commercial / Industrial / Institutional	572.7	2.5%
Forested	5004.0	21.5%
High-Density Residential	158.1	0.7%
Large lot subdivision (agriculture)	1453.1	6.3%
Large lot subdivision (forest)	1112.8	4.8%
Low / Medium Density Residential	8254.3	35.5%
Open Urban Land / Transportation	379.2	1.6%
Water	5.53	0.0%
Total Acres	23,225	100.0%

TABLE 8 Potential Contaminant Sources in the Bel Air Area

	Potential Contaminant Source	Type
1	Dry Cleaners	Above ground PCS
2	Harford County Office Building, UST	UST
3	Bahr Automotive	Above ground PCS
4	Fire Department, Diesel Generator	Above ground PCS
5	Harford County Government, Diesel Generator	Above ground PCS
6	Frederick Ward and Associates (CHS)	Above ground PCS
7	Kroh's Cleaners	Above ground PCS
8	Sheriff's Department Gas Pump	UST
9	Sheriff's Department UST	UST
10	Harford County Government, Diesel Generator	Above ground PCS
11	Sears Roebuck (CHS)	Above ground PCS
12	Dry Cleaners	Above ground PCS
13	Allsigns Shop	Above ground PCS
14	Jiffy Lube	Above ground PCS
15	Auto Service and Repair	Above ground PCS
16	Diesel Generator, UST	UST
17	Mazda Dealership and Service Center	Above ground PCS
18	Cadillac Dealership and Service Center	Above ground PCS
19	Village Automotive Service Center	Above ground PCS
20	Bel Air Auto Auction	Above ground PCS
21	Auto Paint and Body Shop	Above ground PCS
22	Weaver's Body Shop	Above ground PCS
23	Bel Air Auto Auction Service Center	Above ground PCS
24	Auto Service	Above ground PCS
25	Bel Air Auto Auction Service Center	Above ground PCS
26	Chesapeake Fleet Services	Above ground PCS
27	Harford Rental	Above ground PCS
28	Wawa, UST	UST
29	Bel Air High School, Generator	Above ground PCS
30	McCormick Paints	Above ground PCS
31	Auto Service and Repair	Above ground PCS

TABLE 9 Selected Elements of Bel Air’s Water Resources Element (2009)

Element of Water Resource Element, Town's Comprehensive Plan (2009)	
Goal 1: Assure an adequate and safe water supply for current and future development.	
	Objective 1: Follow the recommendations for a source water protection plan as outlined in the MDE report on the Maryland American Bel Air water system.
	Objective 2: Support Maryland American Water Company efforts to improve water collection methods through the construction of additional wells.
	Objective 3: Work with Harford County and Maryland American Water Company to establish alternate means of water supply during low-water periods.
	Objective 4: Cooperate with Harford County and other municipalities in the exploration and evaluation of a regional water authority.
	Objective 5: Work with Harford County to extend its water source protection program to the entire Bynum Run well head recharge area.
Goal 3: Protect the Winters Run and Bynum Watersheds from the adverse impacts of land use change.	
	Objective 1: Improve substandard or nonexistent stormwater management in older developments.
	Objective 2: Limit density and impervious surface area increases in proximity of stream courses and well head protection areas.
	Objective 3: Provide Town and County land use plans that assure protection of the water supply for the Maryland American Water Company.
	Objective 4: Maximize ground water recharge to improve water tables, decrease surface water runoff and improve base flow of stream and wetlands.
	Objective 5: Preserve stream areas by providing adequate buffer areas, restoring riparian and in stream habitats.
	Objective 6: Protect wetlands and encourage wetland mitigation measures.
Action Items	
	Action Item 1: Identify alternate water supply options such as additional well sites.
	Action Item 2: Coordinate a sewer inflow and infiltration detection and repair plan.
	Action Item 3: Develop low-impact BMP requirements for small lot development.
	Action Item 4: Improve stormwater quality in existing developments through retrofit projects where applicable.
	Action Item 5: Encourage the development of innovative stormwater management programs to collect surface runoff, treat and return it back to aquifer.
	Action Item 6: Adopt requirements for riparian and in-stream habitat restoration.
	Action Item 7: Implement a headwater retrofit program, including non structural alternatives to manage water resources, i.e. stream day lighting.
	Action Item 8: Develop measures necessary to meet Total Maximum Daily Load (TMDL) non point source reduction targets, once TMDLs are established by MDE.
	Action Item 9: Work with Harford County to complete a pollution forecast for Bel Air based on the land use plan.
	Action Item 10: Encourage “green building” initiatives to minimize impacts on Town water, sewer and stormwater facilities.

TABLE 10 Selected Elements of Harford County’s Source Water Protection Districts

Prohibited Uses	Exemptions	Impervious Surface Limitations	Stormwater Management	Landscaping Standards	Aboveground Storage Tank Regulations
<p>New or expanded mining or quarry activities</p> <p>New or expanded sanitary landfills and rubble landfills</p> <p>New or expanded hazardous waste collection, transfer or disposal facilities</p> <p>Class V injection wells</p> <p>New underground storage tanks (UST)</p> <p>Applies to any tank or combination of tanks of any size, including underground pipes connected to the tank, where 10% or more of the combined volume of the pipes and tank(s) is underneath the surface. Includes tanks regulated by the Maryland Department of the Environment (MDE) through Code of Maryland regulations (COMAR) 26.10.02 and unregulated tanks (e.g., farm or residential less than 1,100 gallons). Does not include the following:</p> <p>[1] A storage tank located in an underground area such as a basement, if the storage tank is located on or above an impervious surface such as a concrete floor;</p> <p>[2] Wastewater collection systems;</p> <p>[3] Stormwater management facilities; or</p> <p>[4] Propane tanks</p> <p>Surface impoundments, ponds or lagoons, except for stormwater detention and retention ponds and ponds used for recreational or landscaping purposes</p> <p>Manufacturing and production of paving, roofing and other construction materials using petroleum-based coating and preserving materials</p> <p>Dumping of snow from outside the water source protection district</p> <p>Bulk storage of hazardous materials except as follows:</p> <p>[1] Materials needed for normal household use;</p> <p>[2] Waste oil retention facilities required by statute, rule or regulation;</p> <p>[3] Materials needed for emergency generators; or</p> <p>[4] Materials used in water treatment plants</p> <p>Motor vehicle repair shops and motor vehicle filling and service stations, except when located within a designated rural village area as shown on the most recent version of the Land Use Plan, provided all COMAR regulations are met</p> <p>Junk yards</p> <p>Dry cleaning establishments</p> <p>Metal plating establishments</p> <p>Miscellaneous chemical storage or manufacturing</p> <p>Petroleum refining</p> <p>Lubricating oils and greases</p> <p>Offal or dead animal disposal or processing services</p>	<p>Transportation of hazardous materials</p> <p>Application of herbicides and pesticides associated with recreation, agriculture, pest control, roadside maintenance and aquatic weed control shall be exempt from the provisions of this Subsection provided that:</p> <p>[1] The application is completed in strict conformity with the use requirements as set forth in the EPA substance registries. Herbicides and pesticides can only be used according to its labeling and according to pertinent Federal and State laws.</p> <p>[2] The application of herbicides and pesticides shall be noted in the records of an applicator certified by the Maryland Department of agriculture. Records shall be kept of the date and the amount of these substances applied at each location and said records shall be available for inspection.</p>	<p>New impervious surfaces shall be prohibited within 100 feet of all community wells.</p> <p>The amount of impervious surface for all new nonresidential development shall be limited to 50% of the parcel or lot. Existing lots of record with impervious surface coverage of 50% or greater shall minimize the amount of impervious surface associated with the redevelopment of the site. In no case shall the amount of impervious surface exceed 75% or the amount currently on the site, whichever is less.</p> <p>For residentially zoned parcels, the amount of impervious surface shall be limited to the following:</p> <p>[1] On undeveloped lots, new impervious surfaces shall not exceed 50% of the parcel or lot. However, if the lot of record is ½ acre or less in size, the amount of impervious surface may exceed the 50% limit by 25% or 500 square feet, whichever is greater.</p> <p>[2] The redevelopment or expansion of existing residential uses on lots of record shall be permitted provided they do not exceed the 50% limit on impervious surfaces, except as provided in paragraph [3] below.</p> <p>[3] Existing lots of record having impervious surface coverage of 50% or more may increase the amount of impervious surface on site by 500 square feet.</p> <p>[4] For new residential subdivisions, impervious surfaces may not exceed 50% of the overall development.</p> <p>Hydraulic connectivity shall be maintained between impervious surfaces.</p>	<p>For all new development and redevelopment, stormwater management shall be designed to minimize the impact of pollutants to the wellfield.</p> <p>Natural Resource District areas and significant/special natural habitats shall be preserved.</p> <p>Stormwater management systems shall mimic, as closely as possible, the runoff process of the site in its natural state. This shall include, at a minimum, natural storage, infiltration and pollutant filtering functions.</p> <p>[1] Grass swales, vegetated filter strips, bioretention, constructed stormwater wetlands, sand filters and closed sand filters shall be used where possible.</p> <p>[2] Runoff from service stations, towing and vehicle storage areas and maintenance areas with gasoline pumps shall not be infiltrated.</p> <p>All new development and redevelopment shall meet the requirements for stormwater management as specified in Chapter 214 of the Harford County Code, as amended.</p>	<p>Landscaping shall be provided consistent with the standards set forth in §267-29 (Landscaping).</p>	<p>All new aboveground storage tanks shall be located at least 100 feet from all community wells.</p> <p>New aboveground storage tanks shall be:</p> <p>[1] Located on an impervious pad or container of sufficient volume to capture and contain spills and leakage;</p> <p>[2] Sheltered to prevent the intrusion of precipitation; and</p> <p>[3] Located so as to allow for routine visual inspections for leaks.</p>

TABLE 11 Source Water Protection Funding Opportunities

Organization/ Funding Opportunity	Contact	Description	Website
MDA			
Maryland Agricultural Water Quality Cost-Share (MACS) Program	Bill Tharpe (410) 838-6181 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)	Bill Tharpe (410) 838-6181 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/pollutionmanagement/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/multi_mediaprograms/environmental_justice/implementation/details.aspx#ebd
USDA			
Funding for Rural Communities	Stacey Slacum (302) 857-3595	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)	Stacey Slacum (302) 857-3595	Contact specific for Cecil and Harford Counties	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.symlicity.com/index?s=program&mode=form&tab=step1&id=15438a8058b068197cc298e0234f8695

TABLE 12 Bel Air SWPP - Implementation Matrix

Threat	Recommended Action	Estimated Cost *	Funding Sources	Schedule
Releases of Contaminants	Approve Contingency Plan	<\$5,000	General Revenues	within 1 year
Inappropriate Land Use	Wellhead Protection Ordinance (WHPO)	TBD	General Revenues or Tax/fee dedicated to WHP	In conjunction with 2015 Master Plan update
	Watershed Protection Ordinances	TBD	General Revenues or Tax/fee dedicated to Watershed Protection	In conjunction with 2015 Master Plan update, and County Planning
	Update Digital Information/Mapping Resources with new SWAAs	---	General Revenues	within 30 days
	Periodic Updates of SWPP	\$25,000 - \$50,000	General Revenues	every 6 years
	Land Acquisition and/or Easement	site-specific	General Revenues Grants/Loans - see Table 11	As opportunities arise
Need for Public Education and Interaction	Public Education through DPW	<\$10,000	General Revenues In-Kind Support	ongoing
	Additional Signage for Town	<\$200	General Revenues **	within 6 months

* Cost Estimates are based upon current implementation, and do not account for changes in costs over time

** Appropriate signs available from the Maryland Rural Water Association

APPENDIX A

Example Wellhead Protection Ordinance¹

**For the Town of Bel Air,
February, 2014**

**Based on the
Maryland Model Wellhead Protection Ordinance**

**February 1997,
Revised August 2005
Revised August 2007**

**Maryland Department of the Environment
Water Management Administration
Water Supply Program**

¹ This text has not been reviewed, approved, or otherwise endorsed by attorneys, planners or other parties responsible for enacting legislation for the Town of Bel Air. It is provided as a framework and suggestion, only.

Table of Contents

Section 1.0 PURPOSE AND INTENT 3

Section 2.0 DEFINITIONS 3

Section 3.0 AUTHORITY 5

 Section 3.1 Enabling Statute 5

Section 4.0 APPLICABILITY 6

Section 5.0 EXTENT AND DESIGNATIONS 6

Section 6.0 USE REGULATIONS 7

 Section 6.1 Permitted Uses 7

 Section 6.2 Prohibited Uses 8

 Section 6.3 Conditional Uses 9

 Section 6.4 Nonconforming Uses 11

 Section 6.5 Variances 11

 Section 6.6 Exemptions 11

 Section 6.7 Performance Plan Standards 12

Section 7.0 ADMINISTRATION REQUIREMENTS 14

 Section 7.1 Subdivision and Land Development Review 14

 Section 7.2 Notice of Violation 14

 Section 7.3 Stop Work Orders 14

 Section 7.4 Penalties 14

Section 8.0 FEES 15

Section 1.0 PURPOSE AND INTENT

WHEREAS, the ground water underlying the community water supply wellhead protection areas is a source of the Town of Bel Air's existing and future water supply; and

WHEREAS, a safe and adequate source of drinking water is of great benefit to the health and well being of the Town of Bel Air; and

WHEREAS, the aquifer systems supplying the community water supply wellhead protection areas, with its ground water supply, is integrally connected with numerous surface waters and streams; and

WHEREAS, accidental spills and discharges of toxic and hazardous materials can threaten the quality of such water supplies, posing public health and safety hazards; and

WHEREAS, unless preventive measures are adopted to control the discharge and storage of toxic and hazardous materials within the community water supply wellhead protection areas, further spills and discharges of such materials will predictably occur, and with greater frequency and degree of hazard by reason of increasing land development, population, and vehicular traffic within the wellhead protection areas; and

WHEREAS, agricultural and residential development can result in increased nitrogen loading to the ground water from septic systems, fertilizer application and livestock wastes; and

WHEREAS, proper siting, installation, operation, and maintenance of septic systems, agricultural operations, feedlots and animal wastes areas are necessary to prevent contamination of the ground water from excessive nitrogen and pathogenic organisms; and

WHEREAS, the purpose of this ordinance is to protect the public health, safety, and welfare through the preservation of the ground water resources of community public water supplies to ensure a future supply of safe and healthful drinking water. The designation of the wellhead protection districts, and careful regulation of development activities within these districts, can reduce the potential for ground and surface water contamination.

Section 2.0 DEFINITIONS

A. **AQUIFER** means any formation of soil, sand, rock, gravel, limestone, sandstone, or other material, or any crevice from which underground water is or may be produced.

B. **BEST MANAGEMENT PRACTICES (BMPs)** means a conservation or pollution control practice that manages wastes, agricultural chemicals, or hazardous materials so as to minimize movement into surface or ground waters of the State.

- C. **CONTAINMENT DEVICE** shall be defined as a device that is designed to contain an unauthorized release, retain it for cleanup, and prevent released materials from penetrating into the ground.
- D. **EPA** refers to the United States Environmental Protection Agency.
- E. **EPA STORMWATER NPDES PERMIT** shall be defined as a permit meeting the requirements of the National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges issued by EPA on November 16, 1990.
- F. **HAZARDOUS MATERIALS** means any substance that: (1) conveys toxic, lethal, or other injurious effects or which causes sublethal alterations to plant, animal, or aquatic life; or (2) may be injurious to human beings. Hazardous materials include any matter identified as a "hazardous waste" by the Environmental Protection Agency or a "controlled hazardous substance" by the Maryland Department of the Environment.
- G. **MDE** refers to the Maryland Department of the Environment.
- H. **NUTRIENT/MANURE MANAGEMENT PLAN** shall be defined as a plan prepared by a certified nutrient management consultant to manage the amount, placement, timing, and application of animal waste, fertilizer, sewage sludge, and other plant nutrients in order to prevent pollution and to maintain productivity of the soil.
- I. **ON-SITE FLOOR DRAINS** shall be defined as drains which are not connected to municipal sewer or stormwater systems and which discharge directly to the ground or septic system.
- J. **OWNER** shall be defined as a property owner or his duly authorized agent or attorney, a purchaser, devisee, fiduciary, and any other person having vested or contingent interest in the property of question.
- K. **PERSON** shall be defined as any natural person, individual, public or private corporation, firm, association, joint venture, partnership, municipality, government agency, political subdivision, public officer, owner, lessee, tenant, or any other entity whatsoever or any combination of such, jointly or severally.
- L. **PESTICIDE** shall be defined as any substance or mixture of substances intended for: (1) preventing, destroying, repelling, or mitigating any pest; (2) use as a plant regulator, defoliant, or desiccant; or (3) use as a spray adjuvant such as a wetting agent or adhesive.
- M. **RULES AND REGULATIONS OF MDE** shall be defined as official publications of MDE with standards and requirements for protection of ground water resources.
- N. **UNDERGROUND INJECTION WELL** shall be defined as a bored, drilled, driven or dug well whose depth is greater than the largest surface dimension, through which fluids enter the subsurface; or, an improved sinkhole; or, a subsurface fluid distribution system.

O. UNDERGROUND STORAGE TANK means an underground storage tank, connected piping, underground ancillary equipment, and containment system, if any.

P. WELLHEAD PROTECTION DISTRICT means 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. It is bounded and may be influenced by the ground water divides which result from pumping the well and by the contact of the aquifer with less permeable geologic boundaries. In all cases, the Wellhead Protection District shall extend upgradient to its point of intersection with prevailing hydrogeologic boundaries (a ground water flow divide, a contact with geologic formations, or a recharge boundary), or be limited by time-of-travel. The Wellhead Protection District shall be reviewed and approved by MDE.

The Wellhead Protection District may include two (2) zones of protection, with Zone 1 being the most restrictive. Zone 1 is based on a fixed radius from the wellhead. Zone 2 is based on a the Source Water Assessment Area defined for well, based upon the methods for Fractured Bedrock, as defined in the Maryland Department of the Environment's Source Water Source Water Assessment Plan.

Q. YARDING AREAS shall be defined as a pen or other outdoor area used for the feeding and care of livestock or poultry.

Section 3.0 AUTHORITY

Section 3.1 Enabling Statute

WHEREAS, the Town of Bel Air has duly adopted within the Comprehensive Plan, after public notice and hearing, a Sensitive Areas Plan element in accordance with §3.05 of Article 66B of the Annotated Code of Maryland; and

WHEREAS, § 3.05 of Article 66B requires protection of streams and their buffers, 100-year floodplains, habitats of threatened and endangered species (habitat), and steep slopes; and

WHEREAS, § 3.05 (a)(2) of Article 66B authorizes protection of additional types of sensitive areas; and

WHEREAS, the Town of Bel Air has determined through the Sensitive Areas element of the Comprehensive Plan that, in addition to streams and their buffers, 100-year floodplains, habitats of threatened and endangered species, and steep slopes, wellhead protection areas are in need of special protection; and

WHEREAS, § 4.01 of Article 66B empowers the Town of Bel Air with the authority to regulate and restrict land use for the purpose of promoting the health, safety and general welfare of the community; and

WHEREAS, Section 1428 of the Federal Safe Drinking Water Act Amendments of 1986 requires that each state develop a wellhead protection program to protect public water supplies from contamination from contamination; and

WHEREAS, the Maryland Department of the Environment (MDE) has developed a wellhead protection program, approved by EPA, which identifies that local governments have

responsibility for developing programs, including regulations and management controls, to protect public water supplies from contamination.

Section 4.0 APPLICABILITY

A. This Ordinance applies to all land uses and activities located or proposed within the area delineated as the Wellhead Protection District in the Town of Bel Air on a map available for inspection at the office of the Town of Bel Air and as defined in the definitions section of the ordinance. The Wellhead Protection District consists of Zone 1, and Zone 2 as described in 5.0 below.

B. This Ordinance is supplementary to other laws and regulations. Where this Ordinance or any portion thereof imposes a greater restriction than is imposed by other regulations, the provisions of this Ordinance shall control.

Section 5.0 EXTENT AND DESIGNATIONS

A. The Wellhead Protection District includes differing zones of protection as recommended by MDE.

1. Zone 1 represents the area bounded by a fixed radius of 500 feet from the wellhead. MDE has indicated its approval of this area as being consistent with the requirements of Section 1428 of the Safe Drinking Water Act by letter dated _____.

2. Zone 2 represents an area based on a the Source Water Assessment Area defined for a well, based upon the methods for Fractured Bedrock, as defined in the Maryland Department of the Environment's Source Water Source Water Assessment Plan, as delineated in the Sourcewater Protection Plan for the Town of Bel Air (2014, and subsequent updates). MDE has indicated its approval of this area as being consistent with the requirements of Section 1428 of the Safe Drinking Water Act by letter dated _____.

B. The maps delineating the Wellhead Protection District and Zone(s) (1&2) are entitled (title and date) and are incorporated herein and made a part of this Ordinance. The maps shall be on file and maintained by _____. Accurate copies of these maps shall be made available for review by the public.

C. In determining how properties within the Wellhead Protection District depicted on the (title and date of map) are affected by the requirements of this ordinance the following rules shall apply:

1. Properties located wholly within one zone as reflected on (title and date of map) shall be governed by the restrictions applicable to that Zone.

2. Properties having parts lying within more than one zone as reflected on the (title and date of map) shall be governed by the restrictions applicable in each zone.

3. Where the boundary line between two zones passes through a building, the entire building shall be considered to be in that zone in which more than fifty (50) percent of the floor space of the building is situated.

D. The boundary of the Wellhead Protection District or individual zones within the District may be modified should additional information or analysis be provided that shows that the current boundary lines no longer appropriately reflects the criterion which they purport to represent. Such evaluations will be made at a minimum every six years, coincident with preparation of the Town's Comprehensive Plan and Water Resources Element.

Procedures for modification of such boundaries shall be as follows:

1. The applicant wishing a change in boundary shall provide the evidence to the Zoning Commissioner. The applicant shall petition the Zoning Commissioner for a special hearing/District Reclassification and be required to present detailed hydrogeologic and hydrologic information to the Board of Appeals indicating where in fact the new boundary line should be drawn. The applicant shall provide (No. of copies) copies of all reports and maps to the Zoning Commissioner for a technical review of geologic and hydrologic, and any other relevant information. Maps shall be submitted on the same scale or more detailed as the official Wellhead Protection District Maps.
2. The Zoning Commissioner shall seek competent technical advice of such a change request. The Town of Bel Air wellhead protection planning team shall be given a copy of the information given to the zoning commissioner and be granted adequate time to comment on the proposed change.
3. The burden of proof shall be on the applicant to show that the current boundaries do not represent the criterion which they purport to represent.
4. If after receiving written advice from the Town of Bel Air planning team and/or other technical advisors, and the Zoning Commissioner believes that the proposed change has merit, all property owners potentially affected by the changes shall be sent notices indicating the proposed change. An opportunity for public comment of sixty (60) days after notices are sent shall be provided.
5. After close of the comment period the Zoning Commissioner shall make his decision.
6. Any maps so revised shall be incorporated and made part of this Ordinance and kept on file and available to the public for review by (name of appropriate agency).

Section 6.0 USE REGULATIONS

Section 6.1 Permitted Uses

The following uses shall be permitted:

- A. Conservation of soil, water, plants, and wildlife;

B. Outdoor recreation, nature study, boating, fishing, and hunting where otherwise legally permitted;

C. Foot, bicycle, and/or horse paths, and bridges;

D. Normal operation and maintenance of existing water bodies and dams, splash boards, and other water control, supply and conservation devices;

E. Maintenance, repair, and enlargement of any existing structure, subject to Section 6.2 prohibited uses;

F. Residential development, subject to Section 6.2 prohibited uses;

G. Farming, gardening, nursery, conservation, forestry, harvesting, and grazing, subject to Section 6.2 prohibited uses; and

H. 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.

Section 6.2 Prohibited Uses

The following uses are prohibited or conditional within the designated protection zone(s):

			Zone 1	Zone 2
A.		Bulk Storage of Hazardous Materials, except the following ²	X	Cu
	1.	Materials needing for normal household use, outdoor maintenance, and heating of a structure;		
	2.	Waste oil retention facilities required by statute, rule, or regulation;		
	3.	Materials needed for emergency generators; or		
	4.	Materials used in Water Treatment Plants.		
B.		Dry Cleaning Establishments, Coin or Commercial Laundries	X	Cu
C.		Garage, Service Station	X	Cu
D.		Heavy Manufacturing Uses	X	X
E.		Junk Yard	X	X
F.		Yarding Area	X	Cu ³
G.		Manure Piles, Animals Waste Pits, Lagoons, and Sewage Sludge Storage Facilities	X	Cu
H.		Metal Plating Establishments	X	X
I.		On-site Wastewater Disposal	X	Cu ⁴
J.		Open Burning Sites and Dumps	X	X
K.		Quarries and Mining Operations	X	X

L.		Storage of Deicing Chemicals	X	Cu
M.		Disposal of Fuels or Hazardous Materials	X	X
N.		Sanitary Landfills and Rubble Fills	X	X
O.		Bulk Storage and Mixing of Pesticides and Fertilizers ⁵	X	Cu
P.		Underground Injection Wells	X	Cu ⁶
Q.		Underground Storage Tanks	X	Cu
R.		Uses which involve, as a principal activity, the manufacture, storage, use, transport, or disposal of hazardous materials	X	X
S.		Uses which involve hazardous materials in quantities greater than those associated with normal household use ⁸	X ⁷	Cu
T.		Underground pipelines ⁹ carrying hazardous materials	X	Cu
U.		Development with greater than 50% impervious surfaces	Cu	Cu

Key: X = Not Allowed, Cu = Conditional Use

²Secondary containment and release detection standards for in-ground tanks and above ground tanks found later in this manual apply to the exceptions permitted in Zone 1 of the wellhead protection district.

³Counties/municipalities may require nutrient management plans through local regulation or other non-zoning by law/ordinance. Local requirements must be consistent with MDA/SCD standards.

⁴Counties/municipalities should consider requiring commercial and residential developments within this Zone to be serviced by public sewer. For all lots subdivided which propose on-site wastewater disposal, the intention is to ensure that the nitrate-levels do not exceed 10 mg/l. In some instances on-site systems that maximize nitrogen removal may be required. Process wastewater that contain hazardous materials above drinking water standards or otherwise cause harm to the water supply should be prohibited from on-site disposal.

⁵New standards and guidelines adopted by Maryland Department of Agriculture should be referenced as a condition for special exception.

⁶Process wastewater that contain hazardous materials above drinking water standards or otherwise cause harm to the water supply should be prohibited from on-site disposal.

⁷This prohibition does not apply to uses permitted in Section 6.2.A.

⁸Normal household use does not imply that it is acceptable to dispose of hazardous material through the home's plumbing system.

⁹Counties and local governments may be pre-empted from regulating the location of pipelines used in interstate commerce.

Section 6.3 Conditional Uses

Activities that are defined as conditional uses will not be allowed within the Wellhead Protection District unless the property owner can show the use will not harm the ground water and is able to meet the conditions described in 6.3.B and 6.7 of this ordinance.

A. The landowner or representative shall submit to the Town of Bel Air an application for a Conditional Use. The application shall include:

1. A list of all hazardous materials which are to be stored, handled, used, or produced in the activity being proposed.

2. A description of the quantities and containers for the storage, handling, use, or production of hazardous materials by the proposed activity.
 3. A site plan illustrating the location of all operations involving hazardous materials, spill containment structures and showing all points of potential discharge to ground water including dry wells, infiltration ponds, septic tanks and drainfields.
 4. Documentation of approval by MDE of any industrial waste treatment or disposal system or any wastewater treatment system over 5,000 gallons per day (gpd) capacity.
 5. Documentation of MDE permit or approval for any discharge via an underground injection well.
 6. A description and estimate of the average and maximum number of poultry livestock animals that will be yarded within the Wellhead Protection District. Evidence that a nutrient management plan for nitrogen has been completed for all livestock or poultry wastes to be generated by the activity. This plan must incorporate adequate waste holding facilities and show any application sites within the wellhead protection district.
 7. Plans showing secondary containment, for all underground and above ground tanks and lines containing hazardous material.
 8. A description of the best management practices which will be followed during the construction of the facility to ensure that hazardous materials are not released to the ground water.
 9. An emergency plan indicating the procedures which will be followed in the event of a spill of a hazardous material to control and collect the spilled material to prevent the substance from reaching the ground water.
 10. A hydrologic assessment for properties with greater than 50% planned impervious surfaces (building footprints, sidewalks, and transportation surfaces) to determine the ground water recharge rate after site development is completed. The assessment will also estimate the ground water recharge rate prior to development.
- B. The Town of Bel Air shall obtain advice from all appropriate local agencies to assess whether the wellhead protection area will be protected from contaminants which pose an adverse effect on the health or comfort of persons. In making their determination, the Town of Bel Air shall give consideration to the simplicity, reliability, and feasibility of the control measures proposed and the degree of threat to drinking water quality which would result if the control measures failed. Town of Bel Air shall then issue a written decision. In order for the area to be approved, it must be shown that the use:
1. Will protect the water supply from contaminants used on the property which pose an adverse effect on the health or comfort of persons;
 2. Will not cause the average ground water quality on the property to violate drinking water standards promulgated by MDE and the EPA; or
 3. Will maintain recharge of water to the water supply aquifer consistent with rates prior to development. A request may not be approved until all comments provided by

local agencies have been addressed by the applicant to the satisfaction of the Town of Bel Air.

- C. The Town of Bel Air may deny the Conditional Use if it is determined that the Conditional Use would not meet the requirements outlined in 6.3.B. above. The Town of Bel Air's decision shall be made in writing to the applicant.

Section 6.4 Nonconforming Uses

Non-conforming uses lawfully in existence within the Wellhead Protection District may continue to exist in the form in which they existed at the time on this Ordinance is adopted. Changes in title or right to possession shall not effect continuation of an existing use.

In the event a non-conforming use poses a direct hazard to the public water supply, the Town of Bel Air may take any action permitted by law to abate the hazard.

Section 6.5 Variances

Variances to the provisions of this ordinance may be granted by the Town of Bel Air, following a public hearing, provided that a strict interpretation of the Ordinance deprives such property of privileges or safety enjoyed by other similarly situated property within the Wellhead Protection District. Applications for Variances must be presented to the Town of Bel Air.

Section 6.6 Exemptions

The following activities are exempt from regulation under this ordinance:

1. Transportation of Hazardous Material- The transportation of any Hazardous Material through the Wellhead Protection District shall be exempt from the provisions of this ordinance.
2. Application of Pesticides- The application of pesticides in recreation, agriculture, pest control, and aquatic weed control activities shall be exempt from the provisions of this ordinance provided that:
 - a. The application is in strict conformity with the use requirement as set forth in the substances EPA registries. A pesticide can only be used according to its labeling and according to pertinent federal and state laws.
 - b. The application of pesticides shall be noted in the records of an applicator certified by the Maryland Department of Agriculture. Records shall be kept of the date and amount of these substances applied at each location and said records shall be available for inspection.
3. Underground Storage of Oil(s)- The underground storage of oil(s) used for heating fuel shall be exempt from the provisions of this ordinance if the tank used for storage is located within an enclosed structure (i.e., secondary containment or any currently approvable containment technology) sufficient to contain leakage of oil from the environment and to provide routine access for visual inspection (e.g., cement-floored basement), and sheltered to prevent the intrusion of precipitation. Any tank used for the underground storage of oil that is

out of service for more than one year shall be removed. Liquid residue shall be removed and all connecting piping securely capped or plugged.

4. Aboveground Storage of Oil(s)- The aboveground storage of oil(s) used for heating fuel shall be exempt from the provisions of this ordinance provided that the tank used for storage is: 1) located on an impervious pad or container of sufficient volume to capture and contain spills and leakage of oil from entering the environment, 2) sheltered to prevent the intrusion of precipitation and, 3) located in a manner that allows for routine visual inspection.

Aboveground storage of oil shall be located as far away from the public water supply wells as possible.

Section 6.7 Performance Plan Standards

All activities that are designated conditional uses shall meet the following design and operation guidelines. The intent of this section is to encourage the use of Best Management Practices (BMPs) for all potentially hazardous activities in Zones 1 and 2.

A. Containment of hazardous materials. Leak-proof trays under containers, floor curbing, or other containment systems to provide secondary liquid containment shall be installed. The containment shall be of adequate size to handle all spills, leaks, overflows, and precipitation until appropriate action can be taken. The specific design and selection of materials shall be sufficient to contain any hazardous material at the location and prevent escape to the environment. These requirements shall apply to all areas of use, production, and handling, to all storage areas, to loading and off-loading areas, and to aboveground and underground storage areas. Because State and federal governments already regulate hazardous materials nothing in this ordinance shall be applied in a way to prevent a person from complying with State and federal requirements.

B. All underground tanks(s) and piping systems shall meet the requirements of COMAR 26.10.05.03.C 1-4 for secondary containment, double wall tanks, liners, vaults and underground piping.

C. Dry cleaning establishments shall not discharge to the ground or subsurface any wastewater that was in contact with the organic solvents used in dry cleaning process. As specified in A. above, secondary containment is required for areas when dry cleaning solvent is stored, used and transferred.

D. Infiltration of stormwater runoff that has come in contact with the pavement surfaces shall not be permitted at gasoline service stations. Waste from service stations' work areas is not permitted to be discharged to the ground or subsurface.

E. All sewage sludge and animal waste holding facilities shall be constructed so as not to allow the waste material to leach into the ground water. All in-ground facilities shall use low permeability liners constructed to meet one of the standards specified below:

- a. one foot of clay with a permeability less than 10^{-7} cm/sec, or
- b. two feet of clay with a permeability less than 10^{-6} cm/sec or
- c. two feet of compacted soil with a permeability less than 10^{-5} cm/sec, and a manmade liner, 30 mil thick, and permeability less than 10^{-7} cm/sec.

F. Agricultural operations with yarding areas shall follow nutrient management plans for nitrogen. Waste application rates for all sites within the wellhead protection district are to be

designed to not exceed crop requirements and therefore minimize nitrate discharge to ground water.

G. All facilities with wastewater disposal greater than 5,000 gpd shall have a State discharge permit. All developments with on-site disposal shall be designed so that the average NO₃-N concentration of the water recharging the surficial ground water aquifer under the property shall not exceed 10 milligrams per liter.

H. All de-icing chemicals (salt piles and sand/salt mixes) must be stored under roof and protected from precipitation by a permanent cover. Runoff from mixing and loading areas may not be discharged to the subsurface.

I. All facilities with bulk storage of pesticides must show evidence of compliance with Maryland Department of Agriculture requirements.

J. All tanks of liquid fertilizers must have secondary containment of at least 110% of the largest tank within the contained area. All dry fertilizer storage must be under a permanent cover and protected from rainfall.

K. All facilities with underground injection wells must show evidence of compliance with all applicable MDE permits, consent orders, or other State actions, regarding the underground disposal of wastes.

L. All underground pipelines carrying hazardous materials shall be equipped with operable secondary release detection equipment and be protected against corrosion.

M. All excess hazardous materials from the construction of any facility shall not be released to the environment and shall be removed from the property, unless such materials are incorporated into a contained hazardous materials storage area.

N. At all facilities practicing stormwater infiltration the following design standards shall apply:

1. Stormwater management facilities including drainage swales, detention ponds, and retention ponds shall be designed in a manner to provide optimal protection of the ground water resources. Uses of grass swales, open shoulder roads and grass filter strips shall be considered as first options in plan development.
2. At least four feet of soil material is required between the top of bedrock surface or high water table (whichever is higher) and the bottom of any stormwater infiltration pond or system.
3. Stormwater infiltration shall be prohibited in areas receiving runoff from handling and mixing areas of hazardous materials.
4. At least 80% of the predevelopment recharge rate shall be preserved following development. The design shall be made to ensure that this rate can be maintained over the life of the facility.

O. Reporting of Spills. Any spill of a hazardous material shall be reported by the facility owner by telephone to the water supplier, within two (2) hours of discovery of the spill. Clean-up shall commence immediately upon discovery of the spill. A written report detailing the steps taken to contain and clean up the spill and preventing a recurrence shall be submitted to the water supplier within five (5) working days of the spill.

P. Monitoring for Hazardous Materials in Ground Water. If required by the Town of Bel Air, ground water monitoring well(s) shall be installed at the expense of the facility owner or operator in accordance with an approved ground water monitoring plan. The permittee shall be responsible for developing an approved ground water monitoring system. Samples shall be analyzed by a State-certified laboratory and the results reported to the Town of Bel Air

Q. Alterations and Expansion. The Town of Bel Air shall be notified in writing prior to the expansion, alteration, or modification of any activity that is subject to a Conditional Use. Approval by the Town of Bel Air is required before the activity subject to a Conditional Use can begin. The landowner or representative shall submit an explanation of the change in activity and the information as required by this ordinance above.

R. Facilities required by Federal and/or State Law to maintain a Spill Prevention, Control, and Countermeasure Plan (SPCC; e.g. those facilities storing more than 1,320 gallons of oil or petroleum-based liquid above ground, or 42,000 gallons of oil underground, per the Clean Water Act of 1990) will be required to provide copies of these plans with the Town of Bel Air, and to provide updates to the Town when any substantive changes are made, when land use changes, or when the property changes ownership.

Section 7.0 ADMINISTRATION REQUIREMENTS

Section 7.1 Subdivision and Land Development Review

All subdivision proposals and other proposed new development plans within the Wellhead Protection District shall be reviewed by _____ for compliance with the provisions of this ordinance. It shall be the responsibility of the Town of Bel Air to recommend approval, disapproval, or approval with modifications of the proposed subdivision or development plan.

Section 7.2 Notice of Violation

Whenever it is determined that there is a violation of this ordinance, A Notice of Violation shall be issued. The Notice of Violation shall:

1. Specify the violation or violations in writing.
2. Specify the length of time available to correct the violation.
3. Clearly state any penalties associated with the subject violation.
4. Provide a description of any rights of appeal.

Section 7.3 Stop Work Orders

The Town of Bel Air is authorized to issue cease and desist orders whenever it becomes aware of violations of this ordinance.

Section 7.4 Penalties

All costs incurred by the Town of Bel Air, including engineering and attorney's fees for enforcing this ordinance shall be paid by the owner who violated the provisions of this ordinance.

A penalty of up to \$1,000 may be levied for any violation of this ordinance.

Section 8.0 FEES

All fees for review of Subdivision and Land Development Plans shall be established by resolution of the appropriate local governing body. Fees established shall be reviewed annually and adjusted as required. The fees shall include reasonable costs involved with the implementation of this ordinance and may include Administrative and professional staff review costs.