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Source Water Protection Plan for the Westminster, Maryland Public Water System

October, 2013

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Source Water Protection Plan for the Westminster, Maryland Public Water System

Prepared for:

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

Prepared by:



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October, 2013

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List of Acronyms

AGPD	Average Gallons per Day
BMP	Best Management Practices
CEM	Chesapeake Environmental Management
ESD	Environmental Site Design
GIS	Geographic Information System
GPD	Gallons per Day
IOC	Inorganic Compounds
LRP	Land Remediation Program
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
MGPD	Maximum Gallons per Day
MTBE	Methyl-tert-butyl-ether
OCP	Oil Control Program
PCE	Tetrachloroethylene
PCS	Potential Contaminant Source
PWS	Public Water System
PWSID	Public Water System Identification
SOC	Synthetic Organic Compounds
SSP&A	S.S. Papadopoulos & Associates
SWAA	Source Water Assessment Area
SWM	Stormwater Management
SWPP	Source Water Protection Plan
SWPPP	Stormwater Pollution Prevention Plan
TTHM	Total Trihalomethanes
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
WAPID	Water Appropriation Permit ID
WHPA	Wellhead protection area
WHPO	Wellhead Protection Ordinance

REPORT

Section 1

Introduction

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

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

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

Source Water Assessments were completed for Westminster's groundwater sources by Advanced Land and Water, Inc. (ALWI) in 2005, and for surface water sources by MDE in 2004. Since then, the City of Westminster has added new groundwater and surface water sources and a significant portion of this report is an update to the previous SWA reports, including an update to the SWAAs. Recommendations included within the report, however, go beyond those in the original SWA reports (MDE, 2004; ALWI, 2005).

In completing this report, MDE provided assistance through access to files, databases, and GIS data. The report contents were discussed with representatives of the City of Westminster, and public input was solicited to help ensure that recommendations for Source Water Protection were consistent with the City's needs and resources.

1.1 Community Involvement

Opportunities for public involvement were provided during the course of this project. The goals and scope of the project were presented at a public meeting in the City Council chamber on June 11, 2012. Public notices prior to this meeting included an announcement in the Carroll County Times. There were no public comments submitted after this meeting.

The final report will be presented to the Westminster City Council for approval after completion.

Section 2

Background

The city of Westminster, Maryland is located in central Carroll County. Its public water systems (PWS) serve approximately 35,000 people at 10,000 connections, both inside and outside the Westminster City limits (Carroll County et al., 2010). The water supply for Westminster comprises two distinct PWS, both owned and operated by the City of Westminster. These are the Cranberry Water System (PWSID 0060015) and the Wakefield Valley PWS (PWSID 0060017). This report focuses primarily on the larger Cranberry PWS, although the land use analysis, and recommendations are applicable to both PWS.

The City of Westminster encompasses approximately 6.6 square miles at an elevation of approximately 400 to 1,000 ft MSL (Figures 1 and 2). The Westminster Community Growth Area (Figure 1) encompasses approximately 17 square miles. Westminster is located on a major drainage divide, with the northeast-to-Southwest running Parr's Ridge forming the dividing line (Figure 2). The western portion of the City falls into the Double Pipe Creek watershed, part of the larger Middle Potomac watershed. The eastern part of the City is within the Liberty Reservoir watershed, part of the larger Patapsco River watershed. The City retains water resource allocations within both of these watersheds, and discharges wastewater to the Double Pipe Creek watershed.

Currently the City obtains over half of its drinking water supply from surface water, and the remainder from nine active wells. In addition, a number wells and two surface water intakes are permitted but not currently active, or used only for backup purposes.

2.1 System Operations and Infrastructure

Currently the Westminster PWS are permitted to withdraw a total of 4,076,000 gallons per day (gpd) on average, from 17 sources under 15 Water Appropriation Permits (WAP; Tables 1 and 2). Surface water allocations represent about half of this total. Data provided by MDE indicate that since 1980, the Westminster PWS's total water use has been increasing approximately linearly, largely through addition of groundwater supply (Figure 3). From 2002 to 2011, the Westminster PWS appropriated between 900 million and 1.2 billion gallons per year, averaging about 2.9 million gallons per day. This is equivalent to an extraction rate of about 2,031 gpm on average.

In the past ten years, the surface water appropriation (under permit WAPID CL1957S002) has been responsible for about 60% of the City's water supply (Figure 3). Two surface water intakes are situated on Cranberry Branch, both feeding the same pipeline to the primary water treatment plant on Lucabaugh Road. A reservoir north of Lucabaugh Road, on Cranberry branch is used as a temporary storage location for surface water which is subsequently treated. New permits were recently issued for two additional surface water sources – Medford Quarry and Little Pipe Creek – which have not yet produced a significant amount of water.

The remaining 14 sources in the Westminster PWS are groundwater wells. Wells 1, 2, 5 and 7 are completed in carbonate bedrock and are classified as under the direct influence of surface water (GUDI). This designation is an indication of greater susceptibility to surface water

impacts than most groundwater sources, and requires additional monitoring. The other 10 wells are completed in fractured crystalline bedrock.

Wells 1 and 2 comprise the Wakefield Valley water system (PWSID 0060017). While this system is interconnected with the larger Cranberry PWS, the two systems are in different pressure zones, and Wells 1 and 2 are not used to provide water to the Cranberry PWS. The Wakefield Valley allocation is a small portion of the total Westminster allocation, equivalent to about 5%, on average.

As noted above, the Westminster PWS can obtain water from up to 14 groundwater and three surface water sources. Well 12 (Gesell Well) and the Greenvale Mews Well, however, were recently permitted and are not currently active; the Gessell well and associated facilities are currently under design. The City has no current plans to use the Greenvale Mews Well. In addition, some sources are only used as backup or emergency supplies:

- Koontz Creamery Well – water quality is impacted by historic petroleum contamination; used only to supplement surface flows downstream of the Cranberry Branch intake when low flow pass-by requirements cannot otherwise be met;
- Medford Quarry – solely for emergency use

Surface water treatment occurs at the new Cranberry treatment plant (TP) on Lucabaugh Road, opened in 2009. This plant uses a membrane filtration technology of treat the intake, in addition to chlorination and fluoridation of the water supply.

In addition to the treatment plant at Lucabaugh Road, treatment is applied to the source water at each of the wells, via individual treatment plants. Water at every location is treated with chlorine and fluoride. In addition, well-specific treatments include:

	Filtration (Diatomaceous Earth or Sand)	Corrosion Inhibition (orthophosphate)	Volatile Organics Treatment (Granular Activated Carbon)	Radon Treatment (Air Stripping)	Coagulant (Aluminum Chlorohydrate)	pH Adjustment (Caustic Soda)	Nitrate Treatment (Ion Exchange)
Well #3		X					
Well #4		X	X				
Well #5	X (DE)				X		
Well #6							
Well #7	X (sand)				X		
Well #8				X (pending)		X	X
Wells #9 and #10		X					
Well #11				X			
Wells #1 and #2 (Wakefield Valley)	X (DE)						

2.2 Previous Source Water Assessment and Protection Reports

Previous Source Water Assessment Reports were completed separately for the City's surface water and groundwater sources. The SWAP report for surface water sources was prepared by MDE in 2004, and concluded that the major threats to these sources were nutrient enrichment, sedimentation and contamination by pathogenic organisms. In 2005 Advanced Land and Water, Inc. (ALWI) completed a SWAP report for the City's groundwater supply wells, which identified potential sources of contamination such as the Carroll County Airport and underground storage tanks at gas stations, and found that most of the wells were susceptible to nitrate and radon-222 contamination. The report also determined that surface water sources were high in total organic carbon (TOC) causing elevated levels of disinfection byproducts. The report also outlined wellhead protection recommendations including land use controls, upgraded treatment, and public outreach programs.

Section 3

Source Water Assessment

This section of the report provides the updated Source Water Assessment for the Westminster PWS.

3.1 Hydrogeology and Hydrology

The City of Westminster is located in the upland section of the Piedmont Plateau Physiographic Province (Reager and Cleaves, 2008; Figure 4). It is underlain by Upper Precambrian-Lower Paleozoic metamorphic rocks including the Wakefield Marble, Sams Creek Metabasalt, and Wissahickon Formation phyllite. Sinkholes are common in the Wakefield Marble, which underlies valley floors on the western side of the City.

All of the wells in the Westminster system are completed within one of the above formations, and are open to the aquifer at depths from about 30 to about 600 feet (Table 1). These aquifers, consisting of metamorphic rocks with limited porosity, provide useable amounts of groundwater through fractures (secondary porosity). In this area, groundwater occurs primarily under unconfined or semi-confined conditions in fractures in crystalline or carbonate rocks, and its circulation is generally controlled by local topography .

3.2 Review of Water Quality Data

Maryland's Water Supply Program provided SSP&A with compiled analytical data reported for the Westminster PWS from 1990 to 2011. For the purposes of this analysis, ten (10) year' worth of data are reviewed (2001 to 2010). These data represent finished (treated) water results and are reported by Treatment Plant (TP), rather than by well or source.¹ Therefore for wells served by the same TP, e.g. wells 9 and 10, the result potentially represents a blended water sample, and could theoretically underestimate contaminants from a more contaminated well.

The data discussed here are compared to the US Environmental Protection Agency (USEPA)'s Maximum Contaminant levels (MCLs) and Maryland groundwater cleanup standards (MDE, 2008). These are the same results and comparisons provided to PWS customers in the annual Customer Confidence Reports (CCRs). In general, the water quality for the Westminster PWS meets Safe Drinking Water Act standards for human consumption. The detections of compounds presented below do not indicate a current risk to water users, but instead are meant to evaluate and help ameliorate the potential for any future risks to water users.

¹ Total trihalomethane data are primarily reported, however, from distribution system samples, and therefore are not generally associated with a specific source, unless otherwise noted.

3.2.1 Volatile Organic Compounds (VOCs)

For the period from 2001 through 2010, 3,361 VOC analyses were reported for the Westminster PWS, from nine treatment plants. During this time period, the results were non-detect for 58 different VOCs. Five (5) VOCs were detected, and these are listed in Table 3:

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

Methyl-tert-butyl ether (MTBE) is a man-made compound that is often associated with releases of contaminants from underground tanks or surface releases. MTBE was used as a gasoline additive starting in 1979 as an anti-knock additive (replacement for tetra-ethyl lead). After 1992, MTBE was widely used as an oxygenate to enhance complete combustion, and meet requirements of the Federal Clean Air Act. MTBE's use in gasoline was discontinued in 2006. Detection of MTBE was reported at TP-02 (Well 3) from 2004 to 2010, with concentrations decreasing from a maximum of 7.2 ug/l in 2006 to less than 1 ug/l in 2010. Three detections of MTBE were also reported for TP-04 (Well 6) from 2000 to 2002, and one detection was reported for TP-07 (Wells 9 & 10) in 2010; these results were all under 1 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.

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. Their formation in drinking water treatment is most commonly associated with surface water supplies. MDE (2004) noted that total organic carbon (TOC) both raw and finished water at the Cranberry Run TP between 1999 and 2002 averaged below the standard of 2 mg/L, although finished water measurements sometimes exceeded the raw water values. Water with elevated levels of TOC is treated via coagulation to reduce the creation and transport of TTHMs.

The TTHM 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. As shown in Table 3, for the period from 2001 to 2010, results from 28 individual samples exceeded 80 ug/L (<10% of samples) and a higher number exceeded of ½ that level. Under USEPA's Stage 2 Disinfection Byproducts Rule (DBR), however, compliance with this standard is based upon an annual average value rather than individual measurements. For the 10-year period evaluated here, the annual average TTHM (TTHM 2950) concentrations did exceed 40 ug/l in half of those years (Figure 6), although the most recent value > 40 ug/L was in 2008, and the overall trend for TTHM concentrations is decreasing. The decrease in TTHM values is coincident with the onset of treatment in the new Lucabaugh Road TP which came online in February 2009.

A related measure of disinfection byproducts is the concentration of haloacetic acids. For the time in question, these compounds did not exceed the EPA limit (60 ug/L), nor one-half that level in any samples.

3.2.2 Synthetic Organic Contaminants (SOCs)

Samples from the Westminster Public Water System were analyzed for 40 synthetic organic compounds (SOC) in the past decade. Of these, 13 were detected. These are summarized in Table 4 together with the relevant regulatory levels (MCLs). The contaminants detected were:

- Ethylene Dibromide (EDB)
- 2,4,5-TP (Silvex)
- 2,4-D
- Atrazine
- Carbofuran
- Dalapon
- Di(2-Ethylhexyl) Phthalate
- Dinoseb
- Heptachlor
- Methoxychlor
- Metolachlor
- Pentachlorophenol
- Simazine

Ethylene dibromide (EDB) was detected only in TP-03 (Well 4). It is believed to be associated with historic airplane fueling operations (ALWI, 2005). VOC treatment is already installed on this well, and only a single sample, from 2005, exceeded the MCL for this contaminant. Preceding and succeeding results were all non-detects.

Di (2-Ethylhexyl) phthalate is a common plasticizer and laboratory contaminant and is likely not indicative of water quality in the aquifer, but instead reflect sample handling and/or laboratory contamination. Di (2-Ethylhexyl) phthalate exceeded the MCL of 6 ug/l in Wells 3 and 6.

The remaining compounds are all used as herbicides or pesticides and suggest impacts on groundwater from surface sources; none of these were detected in excess of one-half the relevant drinking water standards during the period of interest. These detections are not associated with the GUDI wells (Kriders Church and Carfaro Wells), for which biological contaminants and turbidity are the primary concern), but do reflect the regional land use and impacts on regional groundwater.

3.2.3 Inorganic Compounds

Inorganic compounds reported in Westminster groundwater are summarized in Table 5. Many of these compounds can have both natural and man-made (anthropogenic) sources. Both Nitrate and radon-222 have been detected in excess of the MCL in some samples. None of the other 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. There have been 12 exceedances of the MCL (10 mg/l) from 2002 to 2006 in TP-06 (Well 8), with a maximum of 12.8 mg/l in 2006 (Figure 6). TP-06

shows a generally decreasing trend in nitrate levels from 2006 to 2010. There was also one exceedance in TP-01 (Koontz Creamery Well) in 2005, but this was not repeated subsequently. Concentrations in all the treatment plants have generally remained in a range between 3 and 10 mg/l for the past 10 years, most exceeding one-half the MCL on average. Nitrate concentrations from TP 01 (the surface water supplies) averaged about 5 mg/l for the past ten years, or about one-half the MCL. Prior to 2007, higher concentrations were observed in the Airport well (Well 4), and the Koontz wells (Wells 9 & 10). The average nitrate concentration of ~5 ug/L associated with the surface water supply is consistent with reports of stream quality in Carroll County (Millard et al. (2001). This report indicated that the highest nitrate-nitrogen concentrations were reported for the central part of the County and that Cranberry Branch was among the sampling locations with highest concentrations. Sample results from 1995 in Millard et al. (2001) indicate a nitrate concentration of 8.1 ug/L in Cranberry Branch.

Radon is a naturally-occurring radioactive gas that arises from the decay of radioactive bedrock materials. The EPA has not published a final MCL for radon-222, but the proposed MCL is 300 pCi/L, with an alternate MCL of 4,000 pCi/L if multimedia mitigation program for indoor air is implemented. Since 2001, radon-222 has been detected in all (8) samples reported. Six of these (in Plants for wells 3, 8, 9 10 & 11) have exceeded the proposed MCL, ranging from 2500 to 4450 pCi/L. In addition, the remaining two samples from TP-03 (Well 4) have exceeded one-half the proposed MCL of 300 pCi/L. These results indicate that a significant portion of Westminster's bedrock water supply is susceptible to naturally occurring radon contamination (see also ALWI, 2005). Recent results from Well 8 have been sufficiently high to warrant addition of radon treatment to this well's Treatment Plant.

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. 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. The Safe Drinking Water Act (SDWA) requires testing of raw water if there is a positive detection in a distribution system sample.

Table 6 summarizes the coliform results for the Westminster PWS in finished water for the years 2001 to 2010. During this period, no positive detections for total coliform or fecal coliform were reported.

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 Westminster system:

1. Each source location was visually inspected in the field with the assistance of City of Westminster staff², and then mapped in a Geographic Information System (GIS);
2. Based upon the permitted daily average value permitted for each source, the total annual volume of recharge required was calculated; for permits with more than one source, the permitted value was divided equally;
3. Using MDE's drought annual recharge value for Slade Run (0.6 ft, 1 in 10 year drought) 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 wells are delineated on Figure 7. For wells that had been previously included in the 2005 SWAP report by ALWI, the SWAAs were based on the original wellhead protection area delineations; adjustments were made to account for a slightly smaller recharge value and to ensure a minimum 1000-foot buffer around each source. In addition, since most of the faults and fracture traces in the area trend northeast/southwest, the updated SWAAs are generally elongated in that direction in order to capture probable bedrock fractures.

The total area represented by these SWAAs is about 4,473 acres or about 7 square miles.

3.4 Land Use

Figures 9 and 10 and Tables 8 and 9 illustrate the land use within the Westminster SWAAs and upstream of the Westminster intakes of Cranberry Branch. Within the groundwater SWAAs, about one third of the total land use consists of commercial/industrial/institutional properties, and another quarter is devoted to low, medium, and high density residential areas. The remaining land use is largely agricultural or forested.

Land use varies across the individual SWAAs, however. For example, the land use in the Koontz Creamery well SWAA is heavily commercial and industrial. In addition to already exhibiting contamination from historic petroleum releases, this well is adjacent to a number of large above-ground storage tanks and other industrial activities. Similarly, the SWAA for wells 3, 4, and 5 are located within areas of existing and planned industrial commercial use (including the Westminster Airport), consistent with the contamination already observed in these wells.

About 64% of the groundwater SWAAs are located within the City boundaries. Portions of all the SWAAs extend beyond the current city boundaries, with the SWAA for Well 8 completely outside the city limits. About 95% of the SWAAs for groundwater sources are

² With two exceptions, all wellhead are protected from physical damage by bollards, fences, buildings or protective steel housings. The two exceptions are Well 4 – the Airport well, and the Koontz Creamery Well (not currently used except as backup to supplement stream flows).

located within the Westminster Community Growth Area, with small parts of the SWAA for Wells 3, 8, 9, 10 & 11 falling outside this boundary.

In contrast, the SWAAs further from Westminster City, such as those for Well 11 and Wells 1 and 2, are dominated by residential and agricultural land.

Figure 9 illustrates the proposed zoning for the Carroll County portions of the Westminster Community Growth Area. The portions within the groundwater SWAAs are largely zoned for residential use, with the exception of portions of the Well 3 and 4 SWAAs (near the Westminster Airport) that are zoned for restricted industrial development as part of the Air Business Park and Westminster Technology Center.

More than half (55%) Land use within the Cranberry Branch watershed, upstream of the Westminster intakes, is agricultural, with the remaining amounts attributed to forested and low-density residential areas.

Water and Sewer zoning from the Carroll County Comprehensive Plan is shown in Figure 11. The majority of area within the SWAAs are zones of existing or planned water and sewer services. With the exception of the northwest extremities of SWAAs for Wells 3 and 11, future land use will largely exclude septic systems to the extent that sewer implementation excludes on-site septic.

3.5 Potential Contaminant Sources

In August, 2012, staff of Chesapeake Environmental Management (CEM) completed a survey of the Westminster area to confirm the existence of these Potential Contaminant Sources (PCS) and identify any new ones 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 the MD oil control program (OCP) sites, registered generators of hazardous waste (CHS), registered pesticide dealers, existing and out-of-service underground storage tanks, and Land Remediation Program sites. These were used to create preliminary maps and tables from which CEM staff worked to identify existing PCS.

Thirty-nine PCS were identified in and around the SWAAs (Table 7). These include underground storage tanks (USTs) at gas stations, above-ground fuel tanks, industrial sites, car washes, dry cleaners, and MDE Land Remediation Program (LRP) sites. In addition, the Westminster wastewater treatment plant (WWTP) is located just outside of the southwestern boundary of the SWAA. Because of the relatively dense land use in the Westminster City Center and the dynamic nature of urban areas, it is possible that some PCS were missed during the site survey. This will be addressed in the Land Use analysis below.

3.5.1 Wells 3, 4 and 5 (Airport, County Maintenance, Krider's Church):

The SWAA for these wells straddles the complexly-shaped city boundary near the Westminster Airport, with only about half of the SWAA within the City's boundaries. Almost the entire SWAA is, however, within the Westminster Community Growth Area, and about half the current land use is industrial and institutional, with the largest remaining portions currently agricultural (Table 8). A review of the County and City Zoning (Figure 11) finds that much of

this agricultural land is zoned for future industrial development. A number of PCS were noted in the previous SWAP Report (ALWI, 2005) and are still present. These include

- Carroll County Maintenance Facility - Located adjacent to Well #3, this PCS was observed to be the site of both salt storage and USTs for vehicle fueling, approximately 300 feet northeast of the well. As with other locations where vehicles are maintained, there is also the possibility of other chemicals in use.
- Jiffy Mart / Tevco – Located near the intersection of Route 97, Airport Drive and Magna Way, approximately 1,000 feet from Well 4, this service station hosts Underground storage tanks, and a car wash with the potential for discharge to groundwater. Large retention ponds are located adjacent to the station
- Maryland Highway Administration Garage is located approximately 1,000 feet southwest of Well 5. This was the location of an OCP Investigation/Remediation site regarding a motor oil release; that case is now closed.

In addition, the Miller Asphalt plant is located adjacent to the airport runway, and future development in this area is likely to include both additional industrial activity and stormwater management structures. Consequently, these wells are likely to be among the more susceptible ones to surface impacts. Past impacts have included the man-made chemicals MTBE and EDB, as well, as elevated nitrate levels ($> \frac{1}{2}$ the MCL), likely associated with agricultural activities.

3.5.2 Koontz Creamery Well

The SWAA for this well is situated over the commercial center and most densely populated parts of Westminster. Consequently, the highest density of identified PCS are located within this SWAA – including a number of service stations and car washes, above-ground oil tanks, fertilizer and pesticide dealers, and known contaminated sites associated with the Oil Control Program (OCP) and the Land Remediation Program (LRP). As noted elsewhere petroleum contamination in this well has limited its use, and thus the SWAA, based upon permitted withdrawals, is exaggerated relative to its actual use. Nonetheless, a number of key issues are noted – for example, the proximity of this well to large above-ground storage tanks³ for oil, and the fact that the wellhead, while painted red, is not physically protected from collisions or damage.

3.5.3 Vo-Tech Well (Well 8)

This well is notable for elevated radon and other gases that require pH adjustment. These compounds are natural in origin and reflect geology more than anthropogenic contaminants. Nitrate has also been elevated in this well, although levels in finished water have decreased substantially in recent years. Other than treatment byproducts (trihalomethanes), manmade chemicals have not been reported to MDE for this well in the past decade. It is singled out here, however, to note that the Carroll County Fire Training Facility is located adjacent to, and at a higher elevation than this well. In addition, a stormwater retention pond lies between the two. Fire training activities may include the use of petroleum products and solvents, and thus are a

³ These above-ground tanks are fitted with secondary containment, however.

potential concern, particularly if any contaminated runoff is directed toward the stormwater pond. The previous SWAP Report (ALWI, 2005) noted that “various junked/burnt vehicles and other materials were present at the facility.” These were not observed during the site visit for this report.

3.5.4 Other SWAAs

The remaining SWAAs are dominated by residential, forested and agricultural land uses. Identified PCS as point sources are less common in these SWAAs, but the residential and agricultural uses pose concerns regarding nitrate, pesticides, herbicides and other man-made compounds. More than 20% of the SWAA for the Wakefield Valley Wells (Wells 1 and 2) is comprised of the Wakefield Valley Golf Course, which presents a general concern regarding fertilizers and other products used to maintain greens.

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 relies on existing water quality data, and an evaluation of potential contaminants of concern and their sources. Specifically, if any potential contaminant of concern exceeds ½ the Federal MCL for 10% of the results, a more detailed evaluation is warranted.

Because the Westminster PWS relies on wells open to fractured bedrock and surface water for its water supplies, all of these sources are potentially susceptible to contamination from surface sources. Four sources are classified as under the direct influence of Surface Water (Table 1). The point sources previously identified in or near the SWAAs include potential sources of gasoline, motor oil, other man-made chemicals, and biological contaminants and nitrates (from wastewater discharge).

Potential routes for contamination of groundwater include infiltration through bedrock as well as infiltration through poorly constructed or maintained wellheads. During the site inspections, none of the wells appeared to be in poor condition, or improperly maintained. Most were protected within enclosed structures in well-maintained areas. As noted above, two wellheads are not protected by bollards or other devices that can prevent or minimize damage in case of collision with a vehicle, but otherwise appeared to be in good condition. Concern with sanitary seals or wellhead maintenance is therefore not a primary concern. General land use, control of naturally and anthropogenic contaminants, and infiltration through natural pathways are the primary concerns for these wells.

Man-made contaminants detected at or above ½ the MCL include known contaminants of concern (e.g. EDB in Well 4), and concentrations of MTBE that appear to have decreased in recent years. While pointing to the potential for past and future gasoline contamination, these results do not indicate a current problem with these wells. Notably, chlorination products have in the past exceeded one half the MCL in a significant percentage of samples (see Table 3), suggesting that water treatment options must be carefully monitored for ways of addressing both organic carbon and its reaction products. This appears to have been successful with the formation of TTHM at the new central Treatment Plant that came online in 2009. As noted

above, a significant portion of the Westminster SWAAs are directly overlain by high-density residential and urban areas, including existing and planned industrial uses. These land uses pose the most immediate concern regarding potential impacts to groundwater.

Nitrate concentrations in many groundwater sources are at or near $\frac{1}{2}$ the MCL, although the finished water concentrations are stable to decreasing over time. Notably, the nitrate concentrations observed in surface water samples (from a largely agricultural watershed) are not significantly different than those from groundwater sources, suggesting similar impacts on both the groundwater and surface water resources.

The lack of both coliform and fecal coliform detections (including in GUDI wells) is indicative of appropriate water management practices, suggesting that any surface impacts are managed acceptably through treatment.

Radon was reported in all samples at values greater than $\frac{1}{2}$ the proposed of MCL of 300 pCi/L, and in some cases, in excess of the alternative proposed standard of 4,000 pCi/L. The wells with the highest radon results are Well 3, Well, 8, Well 9, and Well 11. As a naturally occurring compound, the mitigation options for radon are limited to wellhead treatment and water blending, unless new water supplies are explored. Based on these data, it appears that all of Westminster's groundwater supply is susceptible to radon, potentially in excess of regulatory levels, and therefore continued monitoring is essential.

The presence of pesticides and herbicides at low concentrations in surface water and groundwater samples confirms the susceptibility of all of Westminster's water supply to surficial contamination. While not in excess of standards, continued monitoring for these compounds is essential to ensure that any degradation in water quality is detected. In addition, these results point toward the need for further evaluation of land use controls and public education re: the use of domestic and agricultural supplements.

Section 4

Existing Provisions for Source Water Protection

The City of Westminster Code addresses a number of issues important to protection of water resources. These include Stormwater Management (Chapter 136), Sewers and Sewage (Chapter 124), and Storm Sewer Systems (Chapter 135). Both the City and County Water Resources Element of the Comprehensive Plans also contain numerous goals and objectives for water supply, conservation and land use management essential for protecting and preserving water supplies. Federal and State Laws are also implemented, for example through implementation of the Safe Drinking Water Act and the State's and County's Environmental Site Design (ESD) for stormwater management.

Westminster's most recent Comprehensive Plan and Water Resources Element were adopted in 2009. For management of water resources, Carroll County and the City of Westminster maintain a cooperative relationship founded in a formal Town/County Agreement, which establishes the roles and responsibilities of each party (Carroll County, 2010). The implementation of State and local laws are then established between the County and City by ordinance. The agreement allows for a cooperative environment under which coordinated, efficient implementation of regulations and protection measures can take place. In most cases, the County provides staff and other resources to manage, implement, and enforce measures needed to ensure compliance with applicable regulations and protection measures. The Carroll County Water Resources Element (2010) includes both County-wide goals and strategies, as well as a Westminster-specific chapter.

4.1 City of Westminster Comprehensive Plan (Corporation of Westminster, Water Resources Element, 2009)

Selected objectives of the WRE, relevant to this report, include:

- Promote development in areas not environmentally sensitive, and in locations with appropriate infrastructure
- Limit development in sensitive areas such as stream and wetland buffers, floodplains, areas underlain by carbonate rock, and steep slopes
- Implement recommendations from the December 2004 Source Water Assessment and Wellhead Protection report, prepared by Advanced Land and Water, Inc
- Continue collaboration with Carroll County planning staff to provide the most accurate land use/land cover data available for our jurisdiction
- Study and document the functions of natural ground water recharge areas, natural drainage features, and surface water bodies
- Develop regulations to protect recharge areas in order to ensure a healthy aquifer and a sustainable quality water supply
- Support land conservation programs designed to acquire property with particular value for protecting water quality, quantity and recharge

4.2 Carroll County Comprehensive Plan – County-Wide Strategies (Water Resources Element, 2010)

Selected County-wide recommendations in the WRE include:

- Water Supply Strategies
 - Protect and sustain existing water supplies serving existing development
 - Identify and develop, as needed, new water supplies adequate to support planned future growth without over-allocating available sources
 - Develop emergency supply plans and measures
 - Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development
 - Reduce nutrient loading via implementation of the statewide tributary strategies
 - Reduce the amount of impervious surface that could result from development
 - Identify changes to planned land use patterns and land development requirements to help achieve the needed reduction in pollutant loads

Within these Strategies, selected “Action Items” include:

- Incorporate open space and land preservation program measures that will support water protection requirements
- Use inter-jurisdictional/regional approaches as necessary and adopt or amend ordinances as necessary to protection water resources
- Promote and assist municipalities in the adoption of water resource management ordinances
- Delineate and phase community water service areas in the land use element consistent with the ability of the water resource to support development based on population growth and development capacity analysis
- Examine source water protection opportunities and threats to drinking water supplies, including streams and their buffers, from development, runoff, pollution and other causes. Identify private or government actions that can be effective in protecting drinking water supplies
- Create and implement drought management procedures and requirements
- Examine the feasibility of re-using water pumped from area quarries

4.3 Carroll County Water Resource Management Code

In 2004, Carroll County adopted a Water Resource Management Code (Chapter 218-5), which designates water resource management areas, including

- Wellhead protection areas for existing wells and spring supplies
- Aquifer protection areas
- Watershed areas draining to existing and proposed water supply reservoirs and spring intakes
- Sensitive geologic formations
- Stream buffers

By the language of this statute, the wellhead protection areas and aquifer protection areas are defined in the County's Water Resource Management Manual (most recently updated in May 2011). This manual provides management standards and design criteria for

- Regulated Substance Storage and Use
- Community Water Supply Development
- Watershed Protection
- Sinkhole Protection and Mitigation
- Golf Course Impact Assessment

In this manual (Carroll County, 2011), the requirements for handling and storage of regulated substances address the requirements for placement of underground and storage tanks within the various water resource management areas.

Section 5

Recommended Actions

This section provides recommendations to the City of Westminster for protecting its surface water and groundwater resources. It is recognized that the city has limited control on land use or other factors impacting Source Water Protection outside its boundaries, but this issue is addressed through recommendations to work with Carroll County and other interested parties.

The following recommendations are provided for protection of Westminster's Source Water along with the goals and objectives identified in the city and county Comprehensive Plans. Considering the number of goals and objectives identified in the Comprehensive Plans, a phased implementation or prioritization may be appropriate.

These recommendations follow directly from the Susceptibility Analysis that found that

- All of Westminster's sources (both surface and groundwater) are susceptible to man-made contamination, as indicated by the presence of gasoline-related contaminants, nitrate, pesticides and herbicides,
- Naturally occurring contaminants such as radon and elevated carbon that contributes to (treatment byproduct) TTHMs are present at varying levels in both groundwater and surface water sources and must be addressed, and
- Many of these issues have been addressed by improved treatment (e.g. nitrate, TTHM, radon), but it is more cost effective to avoid contamination than to implement engineered treatment.

5.1 Contingency Planning

The City of Westminster maintains an Emergency Plan for Water Treatment and Wells last updated July 2012. The contents of this plan address a number of specific contingencies associated with operation of the Cranberry Treatment Plant. In addition, the following topics are addressed:

- Surface Water Contamination
- Well Contamination
- Drought
- Low Stored Water levels
- Vandalism and Terrorism
- Work Stoppage
- Chemical Spill (in the plant or at wellheads)

Procedures outlined for each of the contingencies include specific procedures (e.g. removing that source from the water distribution system). The plan also contains lists of emergency contacts with phone numbers (e.g. MDE, Water Superintendent, Director of Public Works), contact information for public emergency notification (e.g. Carroll County Health Department, television and radio stations) and a vendor list that includes laboratory and consultant contact information.

For both surface water and groundwater cases of suspected contamination, the recommended procedures are as follows:

- Switch away from that supply or remove the well from service, as appropriate
- Working with MDE, evaluate raw water samples for any suspected contaminants

5.1.1 Amendment to Emergency Plan

It is recommended that the City of Westminster amend their Emergency Response Plan by adding a section with additional information on potential contaminant sources. This information will assist MDE, the City of Westminster, and their consultants to rapidly develop a strategy for evaluating any potential contamination. It is recommended that the following items be added to the plan:

- Figure 8 and Table 7 from this report, and similar figures, as updated in future Source Water Protection Plans

In addition, as 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 where the release of those liquids 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 City obtain copies of these for PCSs within the SWAA, and that the Emergency Response Plan indicate the contact person responsible for storing these materials.

5.1.2 Alternate Water Supply for Impacted Source(s)

In case of loss of water supply due to contamination or another event, the City of Westminster maintains a number of contingencies for backup water supply. These include:

- 115 million gallons of raw water storage in the Cranberry Reservoir
- 0.9 million gallons of finished water storage in the Clear Water Reservoir
- 6.0 million gallons of finished water storage in 4 above-ground tanks
- Emergency supply of 0.655 million gallons per day from the Medford Quarry source

As of 2009, the current estimated daily demand for all of Westminster was approximately 3 million gallons per day. The projected ultimate demand based on a build-out analysis within the Westminster Growth Boundary was 4.4 million gallons a day. Thus, the finished water storage represents between 2 and 3 days of demand.

Under a 2007 Consent Agreement with MDE, the City of Westminster has been working to supplement its emergency water supply, primarily to address potential drought shortfalls. The Medford Quarry and Roops Mill sources were developed in response to this need. There are no additional recommendations for alternate water supply in this report.

5.2 Wellhead Protection Ordinance

It is recommended that The City of Westminster implement a Wellhead Protection Ordinance (WHPO) addressing recommendations contained in the Westminster and Carroll County Comprehensive Plans, as well as from the County's Water Resource Management Manual.

It is recommended that, as per MDE's Model WHPO ordinance, the WHPO provisions be designated by Zone, with Zone 1 representing an area closest to the wellhead, and Zone 2 representing an area defined by the SWAAs delineated in this report (via MDE's methodology for fractured bedrock).

There are options as to how this may be implemented:

- 1) The City may design and implement a WHPO detailing the prohibited, acceptable and/or conditional land uses within each zone as per the MDE Model Ordinance (See Appendix A). Best Management Practices for management of hazardous materials and surface water can also be explicitly addressed. This approach has the advantage of being straightforward and comprehensive, but may be difficult to modify in the future as requirements change.
- 2) The City may take an approach similar to Carroll County, whereby the enacted ordinance is limited in length and actual BMPs and restrictions are delineated in a Water Resource Management Manual.

5.2.1 Scope and Content

Regardless of which implementation methodology is selected, it is recommended that the scope of management options go beyond what Carroll County has implemented in its Water Resource Management Manual. The current version of that manual addresses wellhead protection as follows:

- An area of up to 500 foot radius from the wellhead is differentiated from the rest of the Wellhead Protection/Aquifer Protection Area beyond that radius
- The management standards for regulated substance storage and use⁴ address
 - Underground and above-ground storage tanks – placement relative to wellheads, geological area, and water table
 - A requirement that any activity that involves the storage, use, sale, or maintenance of a regulated substance(s) shall demonstrate to the County that proper safeguards have been proposed to prevent the discharge of the regulated substances(s) to the water resource
 - The County may require a Regulated Substance Management Plan
 - The County may require the installation of monitoring equipment and establish sampling/reporting requirements where it deems necessary
 - All general purpose floor drains located in facilities utilizing regulated substances shall be connected to a public sanitary sewer system (pretreatment may be

⁴ Substances used solely for residential purposes such as routine lawn care or household cleaning are excluded as long as they are used in accordance with the manufacturer recommendations.

- required), on-site holding tank or treatment system, or a system authorized through a state groundwater discharge permit or surface water discharge permit
- All requirements for secondary containment shall ensure the design and construction of the facilities are capable of capturing the regulated substance on-site
 - The design and materials of the secondary containment structure(s) shall be subjected to approval by the County
 - Exclusive of those regulated substances necessary for water supply treatment or as permitted under state regulations, no regulated substance shall be stored, mixed, transferred, or applied within 100 feet of a community water supply well
 - Within Carbonate Rock Areas, no lagoon or pond may be constructed with the intention of storing any quantity of regulated substance unless permitted under applicable State law. If permitted under applicable State law, such structure shall be lined and monitored.

In contrast, Section 6.2 of the MDE Model Wellhead Ordinance (see Appendix A) addresses more specific Land Uses by zone. Many of these uses are relevant to the land uses reasonably anticipated in Westminster, and therefore would entail less effort on the part of the City to address explicitly in a WHPO, than to evaluate on a case-by-case basis.

To be consistent with the Carroll County approach, however, it is recommended that Zone 1 be defined as a 500 foot radius from the wellhead. Alternately, Zone 1 could be referenced to the Carroll County (or Westminster) Water Management manual to preemptively address any future modifications. Nonetheless, implementation of Zone 1 restrictions will result in some non-conforming uses near Well 3, Well 5, and possibly Well 4 (Airport well; Figure 7) – specifically the presence of underground storage tanks, vehicle maintenance, and salt storage within 500 feet of the wellhead.

In general and based on current zoning plans, the greatest opportunity for a conflict between WHPO requirements is within the Well 3, 4 and 5 SWAA, where current land use and future zoning include significant industrial activity. Obviously, there are concerns with creating non-conforming uses within 500 feet of wellheads, although these may be addressed as grandfathered land uses that are evaluated with future ownership or change in land use. Application of BMPs for containment of hazardous materials and surface water management outside Zone 1 provide more flexibility with development of property.

To reduce the potential for conflicting zoning regulations in Zone 1, the WHPO, included as Appendix A, specifically exempts the Air Business Park and Westminster Technology Park Development Areas (currently zoned “Restricted Industrial” and “Planned Industrial”) from compliance with the Zone 1 standards, provided that certain conditions are met. Specifically, those parcels within the defined boundaries of the Air Business Park and Westminster Technology Park Development Areas are required to demonstrate to the Zoning Administrator’s satisfaction that they have taken steps to minimize potential impacts to water quality and quantity that may result from proposed development in this area, and/or meet all requirements for Zone 2 of the WHPO. Additionally, the Zoning Administrator is required to certify that the proposal meets these standards prior to the approval of any proposed Preliminary Plan/Conceptual Plan.

This approach will allow those parcels within the Air Business Park and Westminster Technology Park Development Areas to operate and expand without placing unreasonable demands on previously approved uses while at the same time providing protection to water quality and quantity. This also allows the local zoning official to use their judgment to determine where the balance should be struck between two sets of regulations and goals as based on their constituency's desires.

Any expansion of the Air Business Park or the Westminster Technology Park Development Area beyond their current boundaries, as of October 2013, will require the proposed expansion areas to comply with the same standards for developed as expressed in the two preceding paragraphs.

5.3 Town Zoning and Water System Management

5.3.1 Digital Information/Mapping Resources

It is recommended that the City 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 currently defined and subsequently updated) be permanently incorporated into the zoning and planning process as a required GIS layer, and/or an overlay district.

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

5.3.2 Transfer On-Site Septic to Regional System

A relatively small portion of the SWAAs within City boundaries are currently outside the public sewer areas. The highest densities of non-sewered residences within the city limits are located in the northwest and western portions of the City (Carroll County, 2010), roughly between Route 140 and the Airport, and adjacent to the Wakefield Valley Golf Course. These areas are currently zones for "Priority Sewer." All other non-sewered locations are within zones of planned future and priority sewer extensions (Figure 12). It is recommended that the City continue to promote the transition of residential lands and businesses from on-site septic disposal to regional wastewater treatment facilities. This transition will help to reduce the potential for contamination of groundwater resources with bacteria, viruses, household chemicals and nitrate.

5.3.3 Source Water Assessment Areas and Source Water Protection Planning

It is recommended that the City update the delineation of SWAAs, complete a new inventory of Potential Contaminant Sources, and perform a new Susceptibility Analysis every six years, or at an interval coincident with updates to the WRE. This interval will be sufficient to incorporate new trends in groundwater monitoring data and will also account for changes to

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

After completion of each updated SWPP, the Department of Public Works and the Department of Planning should work together to implement new and updated recommendations. This implementation may include updating the prohibited and accepted land uses within each SWAA.

Coincident with this review of water supply susceptibility, the city council should review the WHPO regulations approximately every six years. This will provide the City with the opportunity to adjust items such as the prohibited land uses and will help to ensure that the WHPO regulations remain viable to implement.

5.3.4 Protection of Wellheads for Well 4 and Koontz Creamery

As noted above, two wells – Well 4, and the Koontz Creamery well, while showing good maintenance of the wellheads and adjacent areas, are not physically protected from damage by vehicles or vandalism. It is recommended that for both of these wells, either protective bollards or a protective steel box be installed to avoid potential damage.

5.4 Public / Governmental Interaction

5.4.1 Regional Cooperation

Currently, the City of Westminster maintains a productive participation in the Carroll County Water Resources Coordination Council (WRCC). The WRCC was formed in 2007 by a non-binding joint resolution between the County, municipalities, and Carroll County Health Department, and provides a mechanism for cooperative problem solving of water resource management issues facing the County and municipalities. Its membership comprises staff members from each of the ten initiating governmental bodies.

As noted elsewhere the SWAAs for Westminster and the watershed for Cranberry Creek lie partly outside the City Boundaries, and thus the City is limited in its ability to implement binding water quality measures. It is recommended that the City continue to participate in the WRCC and use this forum as way of achieving cooperative goals for the recommendations listed here, and for evaluating other measures that may be productive in protecting water resources outside the county boundary. In particular, it is recommended that the WRCC be a forum for implementing important elements of the Westminster WHPO outside the City boundaries.

5.4.2 Establish Inter-Governmental Communication Protocol

It is recommended that the City of Westminster enter into agreements with Carroll County and MDE to explicitly detail the responsibilities of each party with regard to wellhead protection, water quality monitoring, remediation, and similar activities. This agreement should include the creation of two meeting dates per year for the City and the relevant agencies to meet with each other and discuss the state of the water resources under consideration. Items to be included in this discussion would range from newly submitted groundwater withdrawal

applications, current monitoring efforts and results, enforcement and remediation efforts, regulatory changes, and significant development proposals.

Because most of the Surface Water watershed for Cranberry Run lies outside of City limits, it is recommended that cooperation regarding these issues focus on zoning and land use within that watershed.

5.2.3 Public Awareness and Outreach

It is recommended that the City continue to support efforts communicating the importance of groundwater protection to the citizens and business interests of the City. Currently, the City shares the cost of an NPDES Compliance Specialist with Carroll County, as part of the educational requirements of NPDES and Municipal Storm Sewer MS4 permits. It is recommended that the City continue to support this position, expanding the scope of educational materials to include basic information about water resources, recharge to wells, preservation of watersheds, best management practices for residential and business locations and other key issues.

5.2.4 Develop Signage for the Recharge Zones

It is recommended that the City of Westminster develop signage that indicates what areas are located in the Recharge Zone. These signs should be placed along main roads entering the SWAAs. The road signs can explain to the public that they are entering a protected drinking water watershed and provide contact information which can help people to identify and report spills. Proposed locations include the intersections of the SWAA boundaries with the following roads. Placement on State Highways will require cooperation with the Maryland DOT:

- Route 97, north of Magna Way
- Route 97, near Malcolm Drive
- Route 140, west of Hughes Shop Road
- Uniontown Road, west of Royer Road
- New Windsor Road (Route 31), north of Tahoma Farm Road
- Ridge Road, south of Liberty Street
- Washington Road, north of Smith Avenue
- East Main Street, near Fair Avenue

5.2.5 Recognition of Public Contributions

It is also recommended that the City support programs that recognize local individuals and businesses that take specific steps to reduce their water quality and quantity impacts. The Water Resources Element identifies goals and objectives in this regard, but could include elements such as:

- Installation of water efficient plumbing hardware;
- Use of newer stormwater management facilities that promote water infiltration;
- Identification and implementation of business-specific practices that save water (ie for a flower delivery business, instead of washing the vehicle in their parking

lot where the effluent flows into nearby storm drains, the vehicle is washed in a car wash that recycles its greywater or treats the effluent before discharge).

Currently, at least one local group – Waste Not! Carroll, is actively involved in such activities. It is recommended that the City support such activities through in-kind support such as provision of public spaces for meetings, listing of activities on City calendars, etc.

5.3 Land Acquisition and Easements

5.3.1 Creation of Easements

It is recommended that the City should strive to create conservation easements on parcels that offer opportunities to improve water quality. For example, conservation easements can be offered with terms similar to agricultural easements offered by the Maryland Department of Agriculture in that they have a 25 year life-span and offer tax incentives to the property owner for their creation and maintenance.

It is also recommended that the City continue to pursue easements associated with riparian buffer zones in the Cranberry Run watershed. Such easements should focus on preservation of natural growth and elimination of chemical application in the buffer zones both within the City and within the County jurisdiction (see discussion of WRCC above).

5.3.2 Funding Opportunities

It is recommended that the City pursue means of outside funding water quality improvement and community outreach efforts to offset additional costs incurred by protection measures and recommended actions identified. EPA and MDE provide opportunities for grants and loans through various programs targeted for specific purposes. Table 10 provides information pertaining to each funding opportunity and contact information to pursue funding.

5.4 Implementation

Table 11 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 “---” or “TBD” in the table.

Section 6

Conclusions and Summary

The Source Water Assessment for Westminster's Public Water System has been updated to account for the current permitted water withdrawals. New Source Water Assessment Areas have been delineated, using MDE's prescribed method of hydrogeologic mapping. These comprise about 4,473 acres associated with 14 permitted groundwater sources and 1,585 acres associated with the watershed upgradient of the Cranberry Run Intake

The susceptibility analysis for the Westminster PWS finds that all of the groundwater and surface water sources are potentially susceptible to surface contamination, including VOCs, IOCs, and SOCs. Detections of VOCs and SOCs in the past ten years indicate known contamination with EDB and a variety of pesticides and herbicides associated with surface use. In addition, both nitrate and radon-222 have shown elevated levels in a number of sources – annual average values that exceed ½ the relevant MCL. The nitrate is most likely associated with surface land use such as agricultural activities, and is consistent with known surface water degradation in the Cranberry Run watershed. The radon-222 is likely a naturally occurring contaminant that is associated with Westminster's fractured bedrock.

Elevated levels of TTHMs - greater than ½ the MCL, have been observed over the past decade. These levels are associated with chlorination treatment of sources, and concentrations have fallen substantially since 2008 and startup of the new Lucabaugh Road treatment plant.

Recommendations to the City of Westminster include the following

- Amending the City's Emergency Plan to include a section with additional information on potential contaminant sources (PCS)
- Implementation of a Wellhead Protection Ordinance (WHPO)
- Continuing to support Digital Information/Mapping Resources, including incorporation of the SWAAS as a required layer for planning
- Updates to the SWAA areas and Source Water Protection Plan about every 6 years, coincident with Comprehensive Planning
- Transfer of on-site septic to the City system
- Protection of Wellheads for Well 4 and Koontz Creamery
- Continued participate in the Carroll County Water Resources Coordination Council
- Establishment of an Inter-Governmental Communication Protocol
- Public Awareness and Outreach about water supply as part of the NPDES public education program
- Signage for the Recharge Zones
- In-kind support for recognition of public contributions to water resource preservation via local environmental groups
- Land Acquisition and Easements to preserve property, particularly in sensitive stream buffer areas

Section 6

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FIGURES

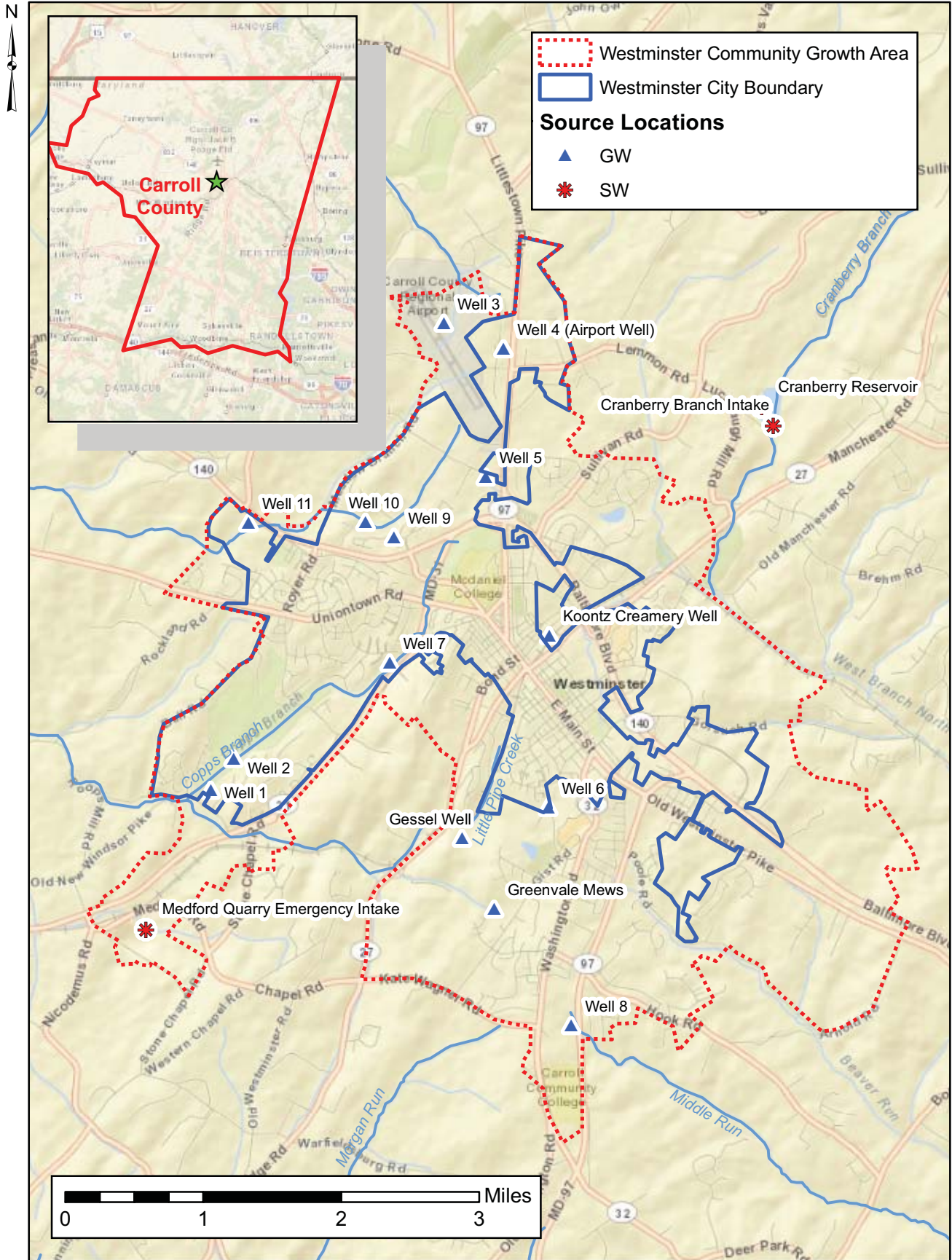
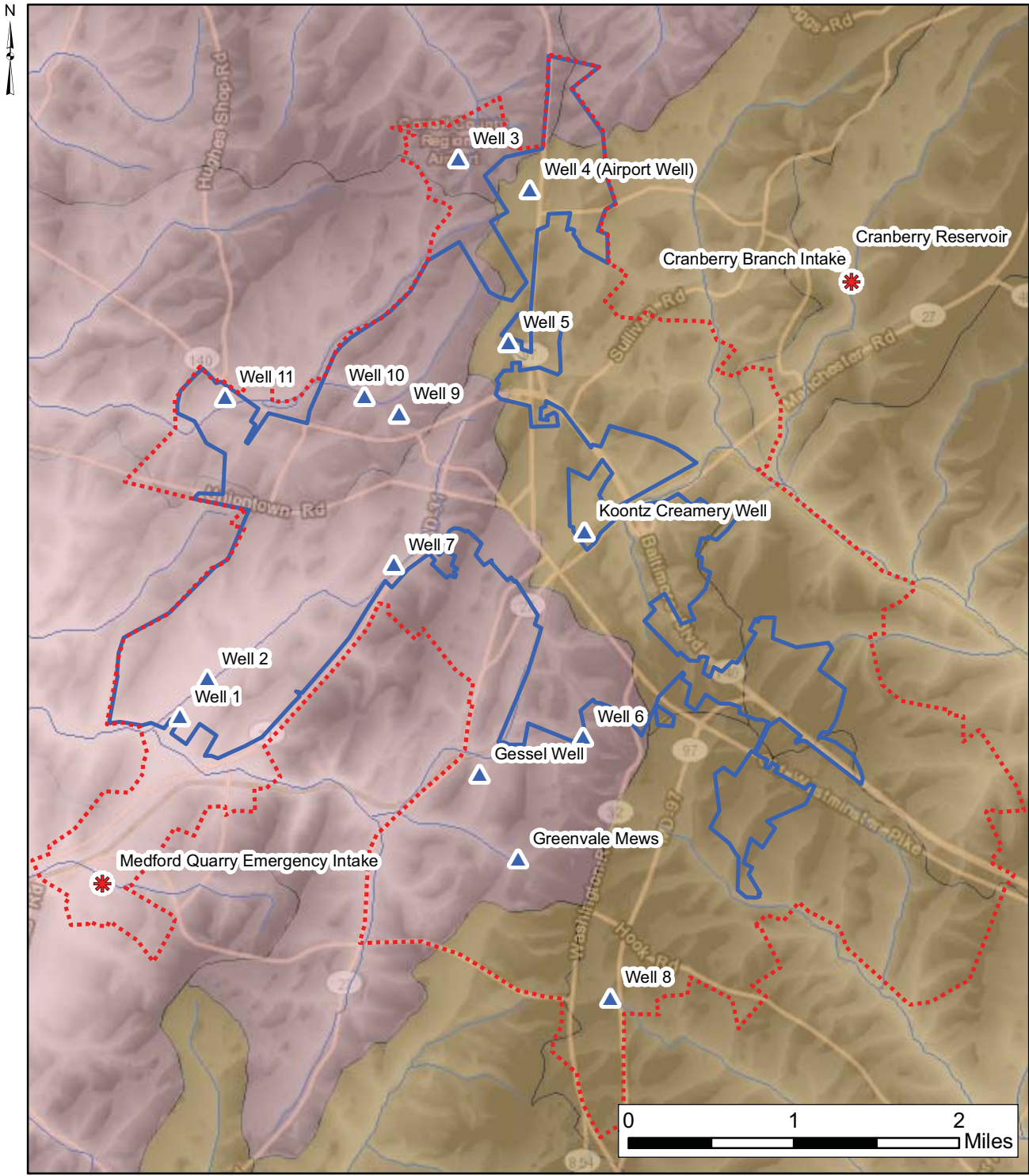


Figure 1 Location of Westminister, Maryland and Sources of the Westminister PWS



Source Locations		Westminister City Boundary	Watersheds
▲	GW	— Westminister City Boundary	— Double Pipe Creek
✱	SW	- - - Westminister Community Growth Area	— Liberty Reservoir

Figure 2 Topography and Watersheds of Westminister, MD

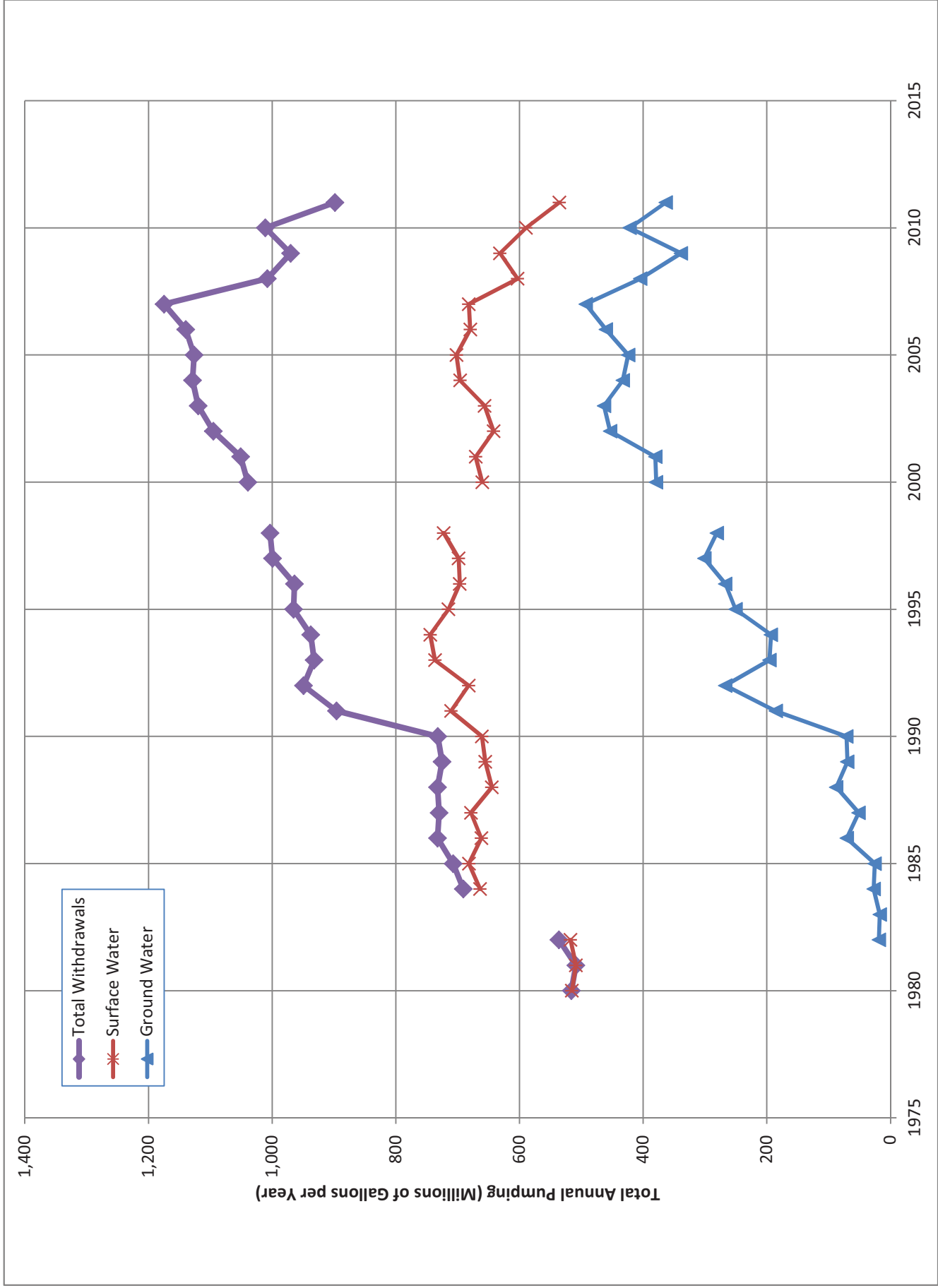


Figure 3 Reported Water Use by the Westminster PWS, 1980-2011

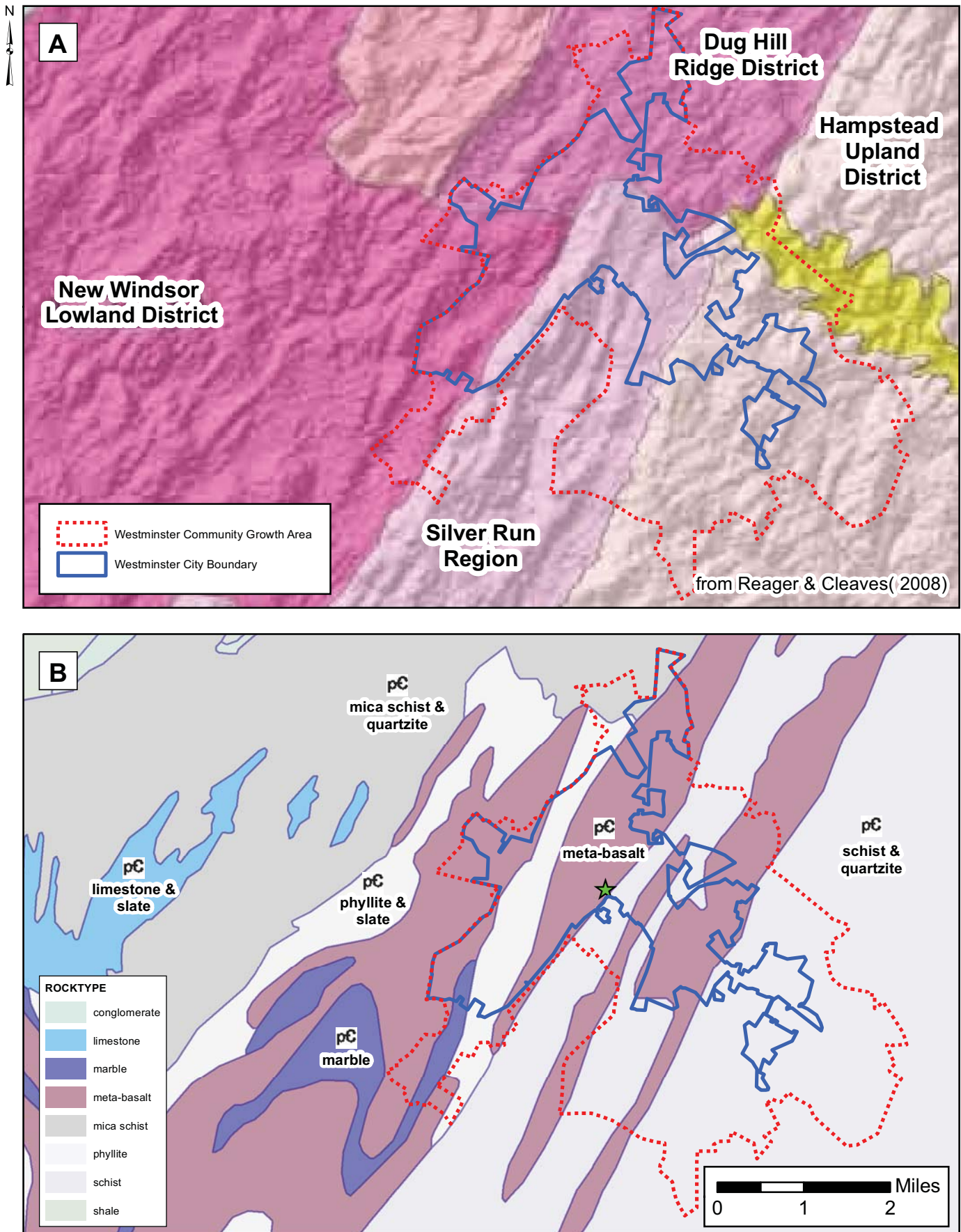


Figure 4 Physiographic Provinces of Maryland (A) and Bedrock Geology (B) in the Westminster Area

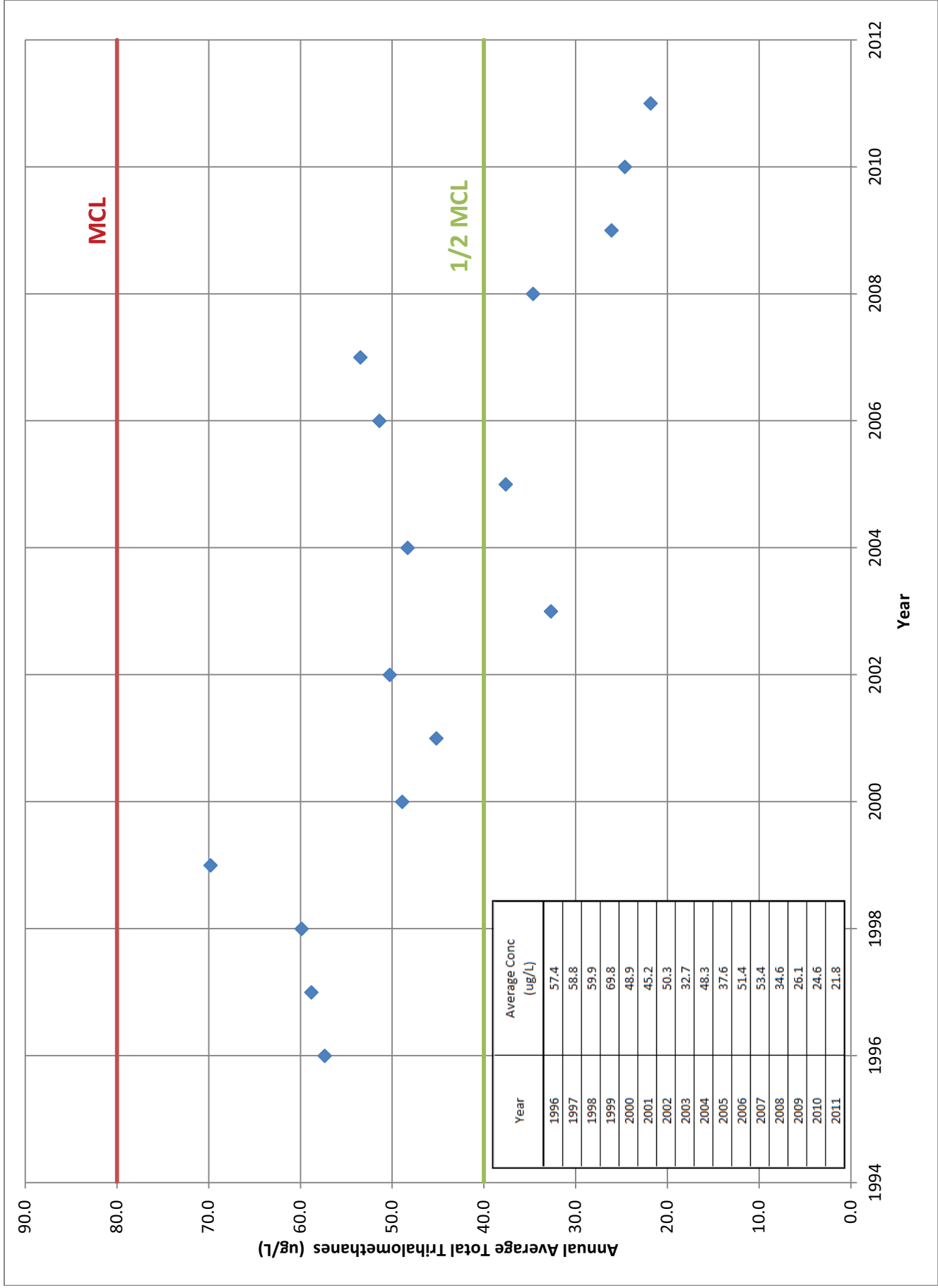


Figure 5 Annual Average Total Trihalomethane Concentrations in the Westminster PWS (1996 to 2010)

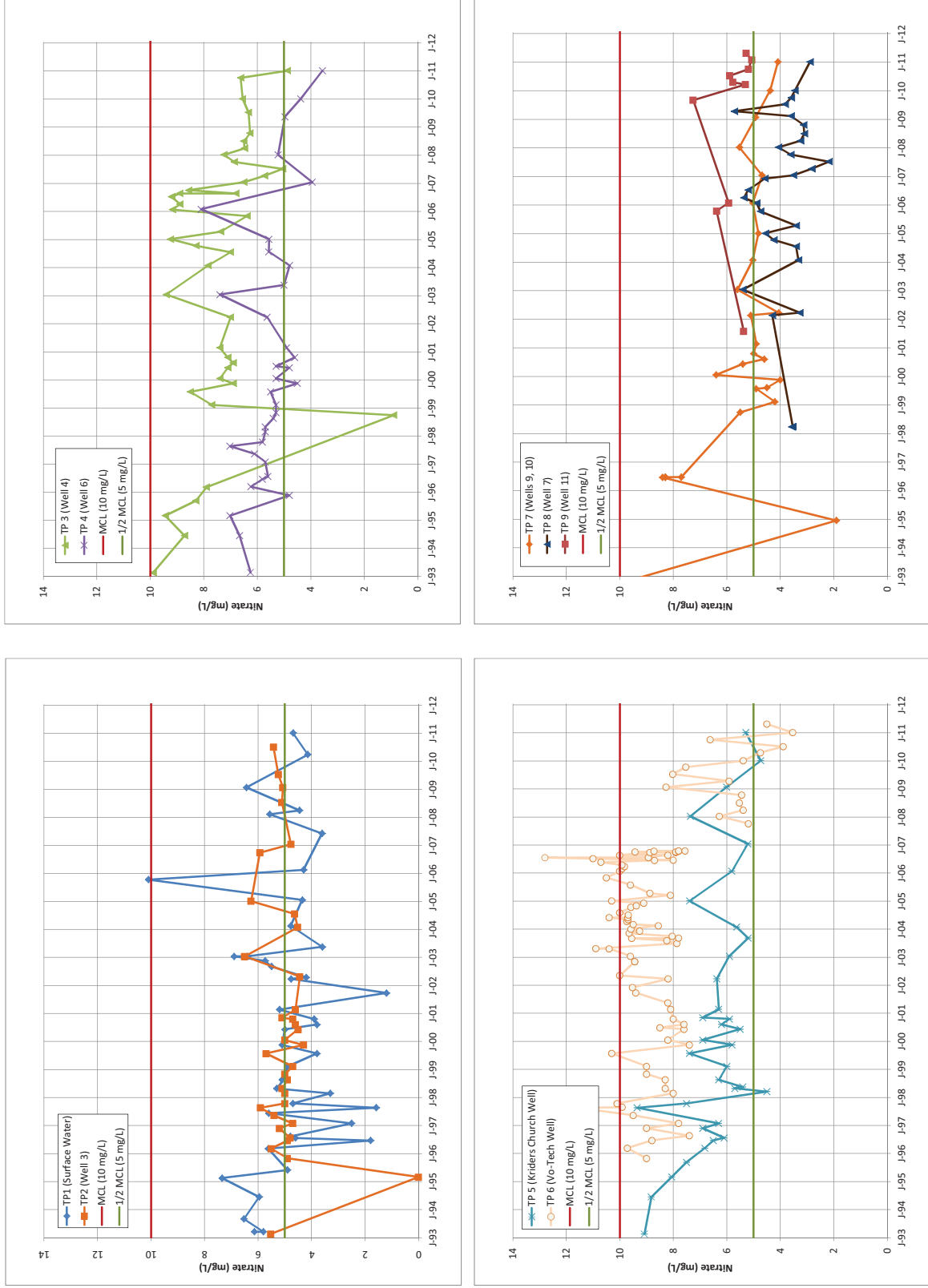


Figure 6 Nitrate Concentrations Reported for the Westminster Public Water System

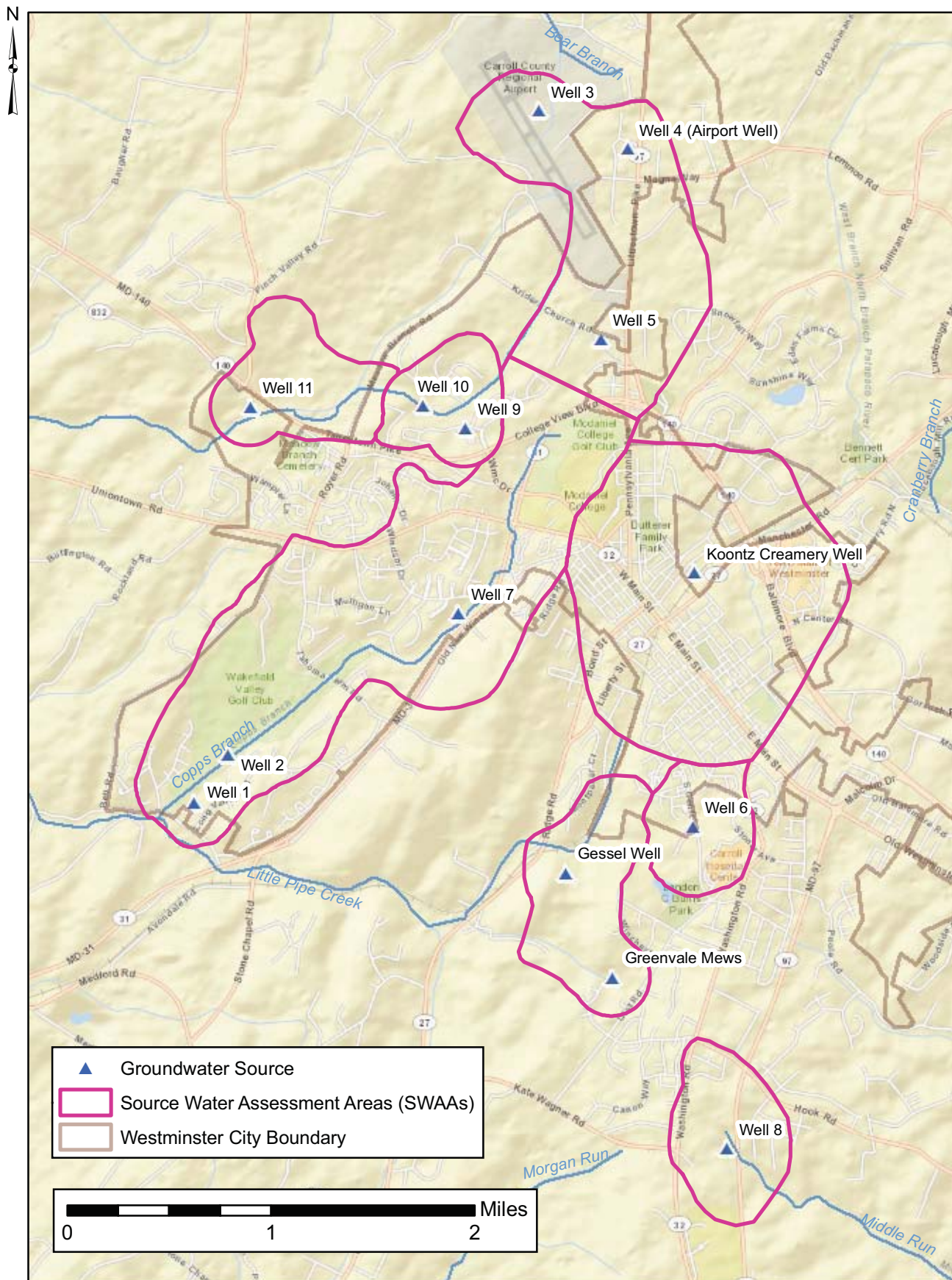


Figure 7 Source Water Assessment Areas for Groundwater Sources in the Westminster PWS

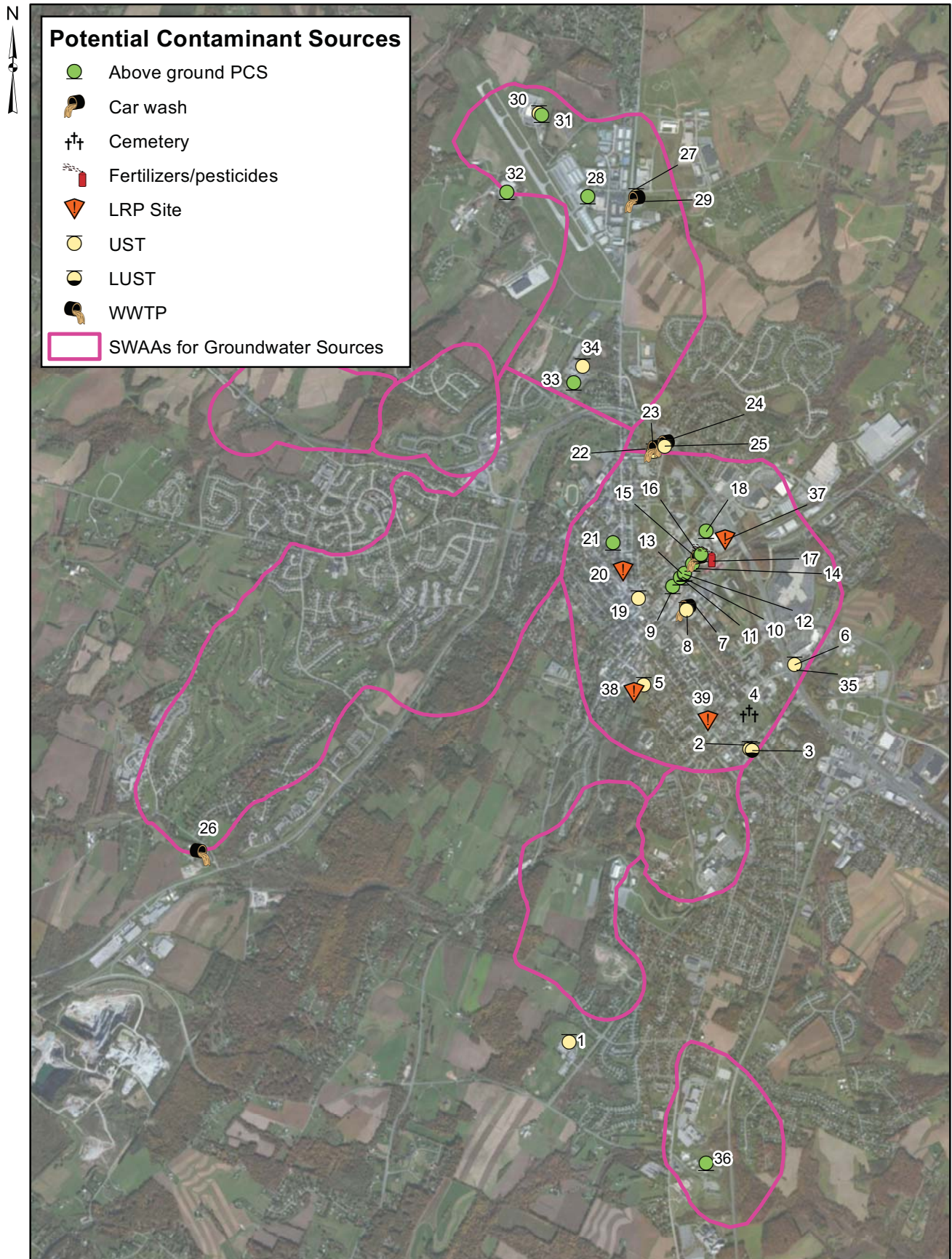


Figure 8 Potential Contaminant Sources (PCS) in the Westminster Area

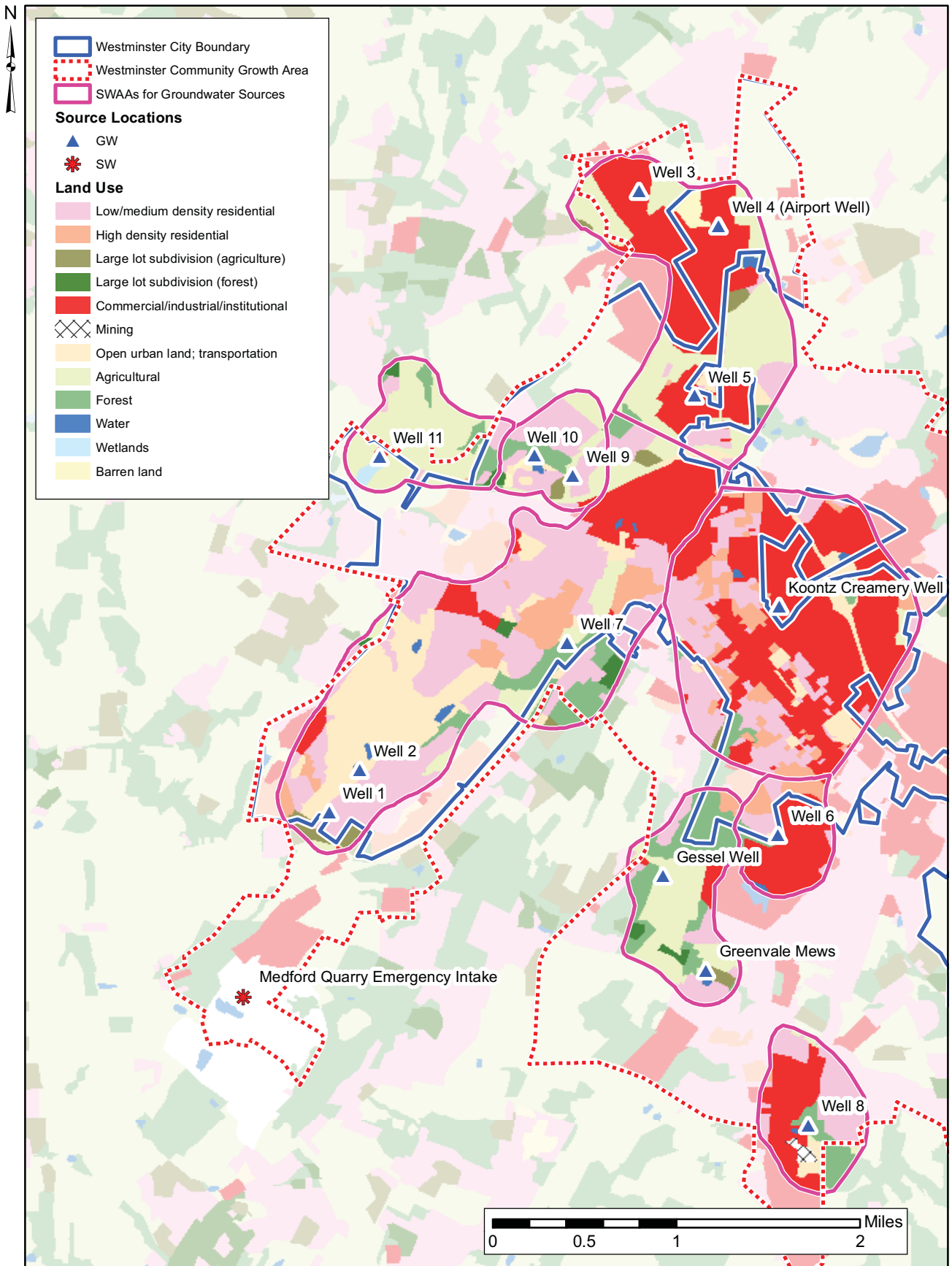


Figure 9 Land Use in the SWAA for Wells in the Westminster Public Water System

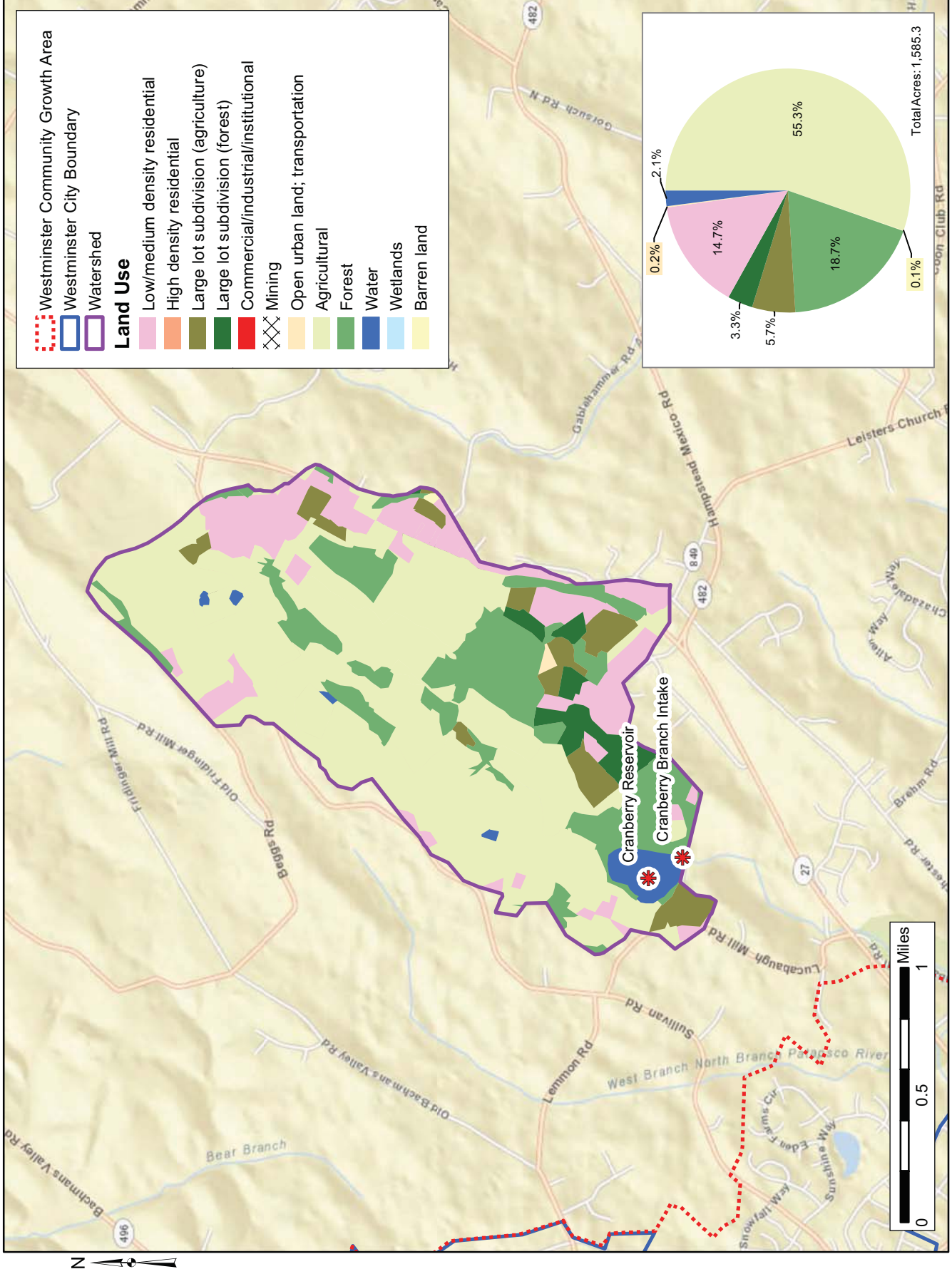
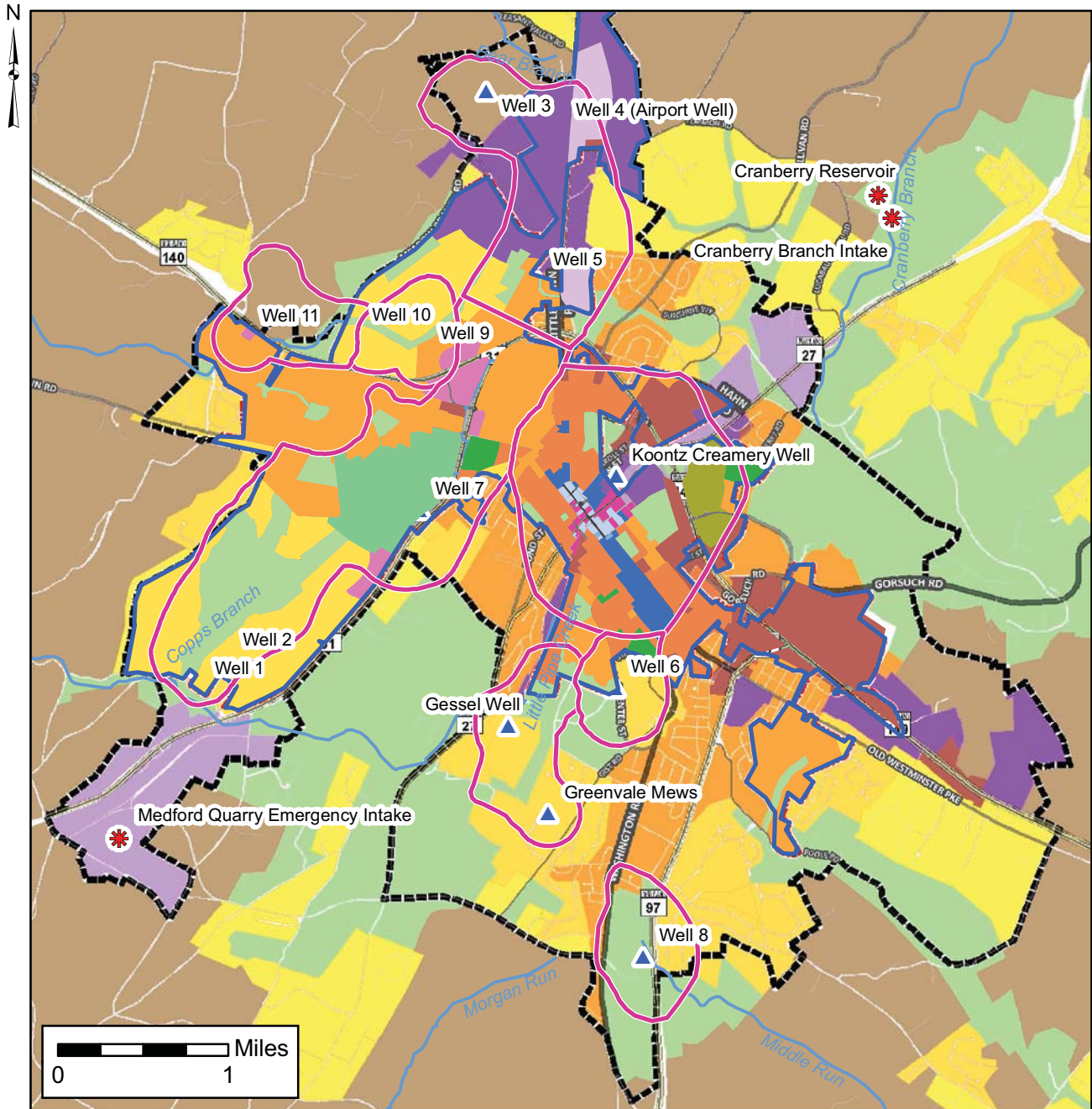


Figure 10 Land Use in the Cranberry Branch Watershed Upstream of the Westminister PWS Intakes



SWAAs Westminster City Boundary

Zoning

Agriculture	I-G General Industrial	PD-4 Planned Development 4
B Business	P-I Planned Industrial	PD-9 Planned Development 9
C Conservation	I-R Restricted Industrial	R-7,500 Residential
C-B Central Business	MUI Mixed Use Infill	R-10,000 Residential
C-C Central Commerce	N-C Neighborhood Commercial	R-20,000 Residential
D-B Downtown Business	P-RSC Planned Regional Shopping	R-40000 Residential

Figure 11 Westminster and Carol County Zoning

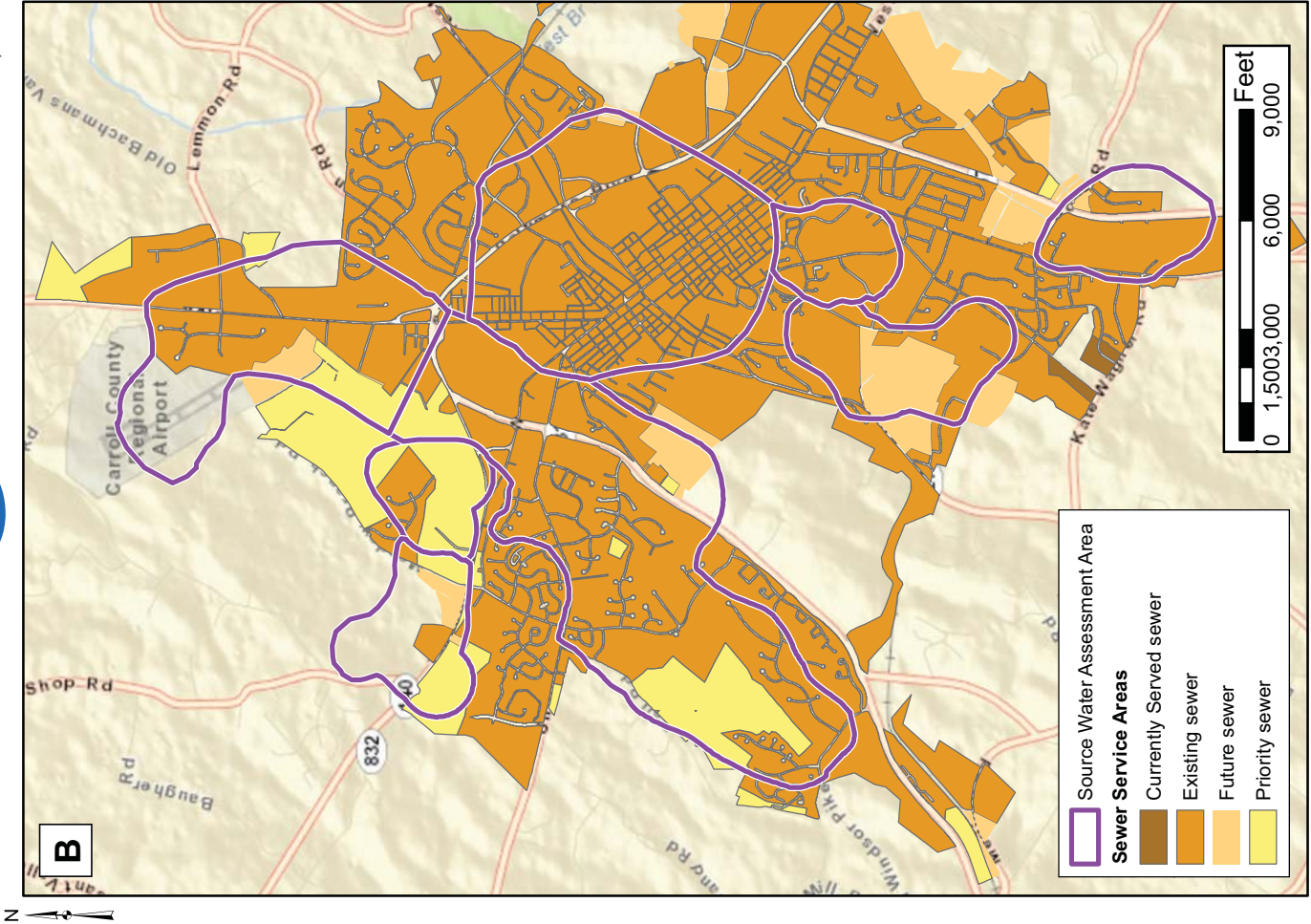
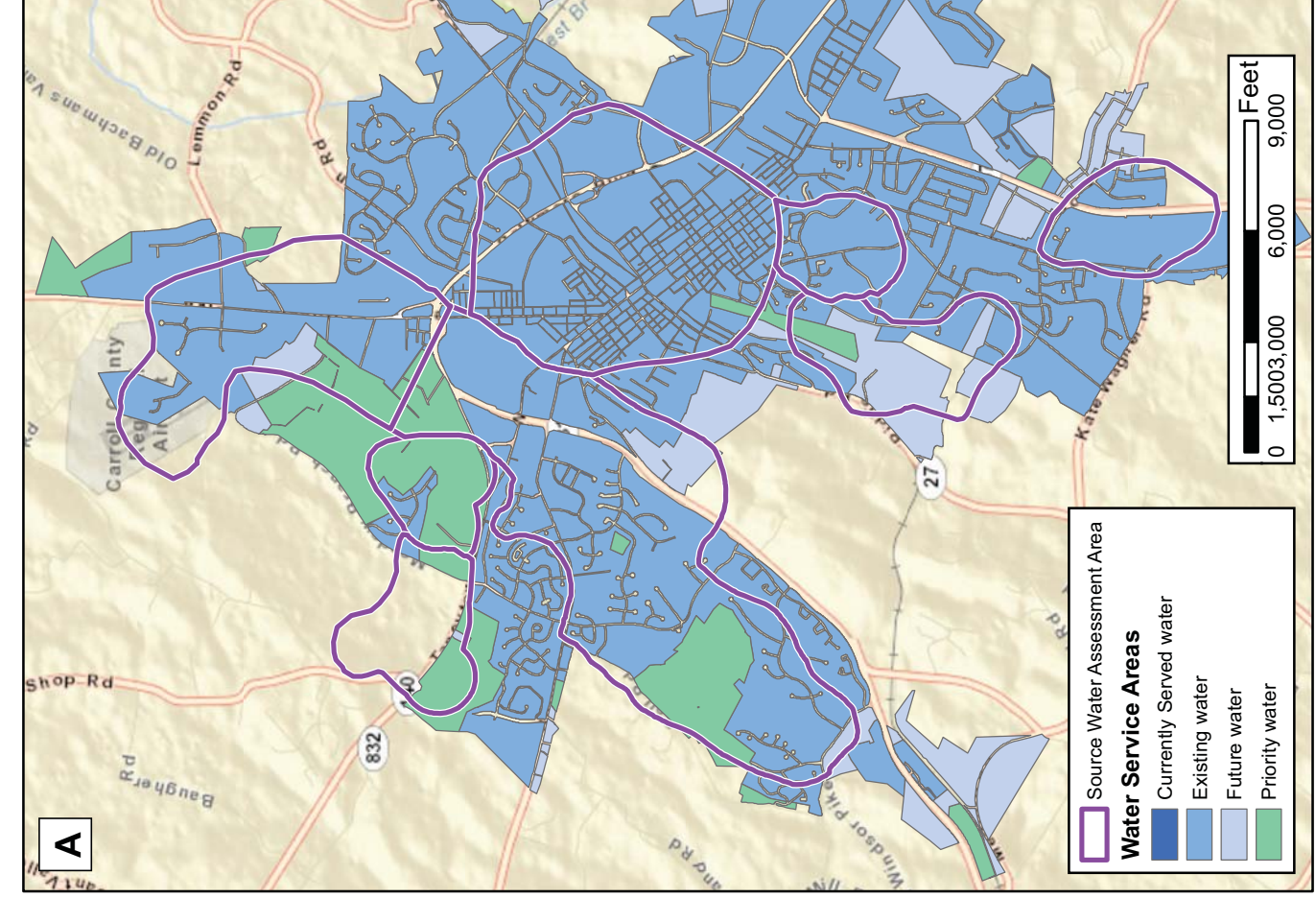


Figure 12 Water Service (A) and Sewer Service Areas (B) in the Vicinity of Westminster

TABLES

TABLE 1 Sources of the Westminster Public Water System

SOURCES ADDRESSED IN THIS REPORT											
No.	Source Type	Source ID	Plant ID	Source Name	Well Permit	WAPID [#]	Total Depth (ft)	Casing Depth (ft)	Completion Date	GUDI?*	SOURCES IN 2004/2005 SWAP REPORTS
1	GW	1	2	COUNTY MNT (WELL 3)	CL739600	CL1977G236	300	258	7/8/1981		YES
2	GW	2	3	AIR BUS. (WELL 4)	CL739048	CL1977G136	425	117	4/20/1981		YES
3	GW	4	5	KRIDERS CHURCH (WELL 5)		CL1977G436	648	209		YES	YES
4	GW	3	4	S CENTER ST (WELL 6)	CL810249	CL1977G336	623	116	5/24/1983		YES
5	GW	10	8	CARFARO (WELL 7)		CL1977G636	327	33		YES	YES
6	GW	5	6	VO-TECH (WELL 8)	CL814631	CL1977G736	175	27	6/28/1987		YES
7	GW	8	7	WELL 9 (KOONTZ MGS WELL)	CL880449	CL1977G836	241	57	12/15/1989		YES
8	GW	9	7	WELL 10		CL1977G836					YES
9	GW	15	9	ROOPS MILL (WELL 11)	CL943169	CL2000G025	250	73	7/18/2001		YES
10	GW	98	1	KOONTZ CREAMERY WELL (BACKUP)		CL1977G036	129	59			---
11	GW	n/a	n/a	Well 12 (Route 27; Gesell Well) (NOT ACTIVE)		CL2007G019					---
12	GW	n/a	n/a	Greenvale Mews (NOT ACTIVE)		CL2008G001					---
13	SW	7, 11, 12, 13, 14	1	SURFACE WATER Cranberry Branch, Cranberry Branch Reservoir, W. Branch Patapsco		CL1957S002					YES
14	SW		1	SURFACE WATER Little Pipe Creek (Rte 31 & 852)		CL2006S025					---
15	SW	16	1	SURFACE WATER Medford Quarry							---
16	GW	---	---	WELL 1 (Wakefield Valley) **		CL1977G536	80			YES	YES
17	GW	---	---	WELL 2 (Wakefield Valley) **	CL738750	CL1977G536	307	113		YES	YES

* Groundwater under the direct influence of surface water

** The Wakefield Valley PWS (PWSID 0060017) is owned and operated by the City of Westminster, and is interconnected with the Cranberry Water System (PWSID 0060015)

[#] Westminster wells operate under 15 Water Appropriation Permits (WAPID); see Table 2

TABLE 2 Water Appropriation Permits for the City of Westminster

No.	WAPID	System	Sources	AGPD	MGPD
1	CL1977G236	Westminster - Groundwater	COUNTY MNT (WELL 3)	85,000	111,000
2	CL1977G136	Westminster - Groundwater	AIR BUS. (WELL 4)	72,000	94,000
3	CL1977G436	Westminster - Groundwater	KRIDERS CHURCH (WELL 5) [GWUDI]	215,000	280,000
4	CL1977G336	Westminster - Groundwater	S CENTER ST (WELL 6)	85,000	111,000
5	CL1977G636	Westminster - Groundwater	CARFARO (WELL 7) [GWUDI]	233,000	303,000
6	CL1977G736	Westminster - Groundwater	VO-TECH (WELL 8)	119,000	155,000
7	CL1977G836	Westminster - Groundwater	WELL 9 (KOONTZ MGS WELL) & Well 10	95,000	124,000
8	CL2000G025	Westminster - Groundwater	ROOPS MILL (WELL 11)	135,000	176,000
9	CL1977G036	Westminster - Groundwater	KOONTZ CREAMERY (BACKUP)	500,000	750,000
10	CL2007G019	Westminster - Groundwater	Well 12 (Route 27; Gesell Well)	137,500	360,000
11	CL2008G001	Westminster - Groundwater	Greenvale Mews (100 Greenvale Rd)	27,500	72,000
12	CL1957S002	Westminster - Surface Water	All Surface Water	1,838,000	3,000,000
13	CL2002G042	Westminster - Surface Water	Medford Quarry / Pending	162,000	655,000
14	CL2006S025	Westminster - Surface Water	Little Pipe Creek (Rte 31 & 852)	165,000	1,100,000
15	CL1977G536	Westminster - Groundwater (Wakefield Valley)	Well 1 & 2 [GWUDI]	207,000	269,000
	TOTAL			4,076,000	---

TABLE 3 Volatile Organic Compounds (VOCs) and Total Trihalomethanes (TTHM) Reported for the Westminster PWS

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	Dec-04	Feb-10	20	18	7.2
Methyl-tert-Butyl-Ether	4	Sep-01	Aug-02	18	4	0.8
Methyl-tert-Butyl-Ether	7	Feb-10	Feb-10	8	2	0.7

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	Mar-01	Dec-10	12	10	10.7
Bromodichloromethane	6	Mar-03	Mar-03	4	1	4.8
Bromodichloromethane	7	May-04	May-04	4	1	0.7
Bromodichloromethane	8	Feb-02	Jan-10	8	8	3.6
Bromoform	1	Sep-05	Sep-05	12	1	0.2
Bromoform	8	Aug-02	May-04	8	2	0.8
Chloroform	1	Mar-01	Dec-10	12	10	31.8
Chloroform	4	Sep-01	Jan-10	9	9	2.4
Chloroform	6	Mar-03	May-09	4	4	17.4
Chloroform	7	May-04	Feb-10	4	2	0.8
Chloroform	8	Feb-02	Dec-07	8	7	2.7
Chloroform	9	Sep-09	Sep-09	7	1	0.7
Dibromochloromethane	1	Mar-01	Dec-10	12	10	3
Dibromochloromethane	8	Feb-02	Jan-10	8	8	2.5

C. Total Trihalomethanes

Contaminant	Plant ID	Number of Samples	Exceedances of One-Half MCL (40 ug/l)	Exceedances of MCL (80 ug/l)
TTHM 2950	0 *	135	48	12
TTHM 2950	1	118	57	14
TTHM 2950	2	3	3	1
TTHM 2950	3	2	2	
TTHM 2950	4	2		
TTHM 2950	7	1	1	1

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

Contaminant	Plant ID	Earliest Detect Date	Most Recent Detect Date	Number of Analyses	Count of Detections	Max Concentration (ug/L)	MCL *
2,4,5-TP (Silvex)	1	5/18/2009	5/18/2009	11	1	0.84	50
2,4-D	1	6/6/2005	6/6/2005	11	1	0.17	70
Atrazine	1	5/22/2001	7/21/2010	37	13	0.72	3
Carbofuran	1	6/16/2009	6/16/2009	12	1	0.2	40
Dalapon	1	5/12/2004	5/12/2004	11	1	0.62	200
Di(2-Ethylhexyl) Phthalate	1	9/25/2001	5/18/2009	31	10	4.4	6
Di(2-Ethylhexyl) Phthalate	2	12/6/2001	6/6/2007	4	3	6.8	6
Di(2-Ethylhexyl) Phthalate	3	5/19/2003	5/1/2006	4	2	1.9	6
Di(2-Ethylhexyl) Phthalate	4	12/6/2001	12/10/2007	4	3	16.2	6
Di(2-Ethylhexyl) Phthalate	5	9/9/2003	9/15/2008	2	2	1.2	6
Di(2-Ethylhexyl) Phthalate	6	8/8/2002	11/19/2008	3	3	4.4	6
Di(2-Ethylhexyl) Phthalate	7	6/6/2005	9/15/2008	3	2	1.1	6
Di(2-Ethylhexyl) Phthalate	8	6/6/2005	9/15/2008	3	2	0.8	6
Dinoseb	4	1/13/2010	1/13/2010	4	1	0.1	7
Ethylene Dibromide (EDB)	3	5/9/2001	4/15/2010	36	5	0.07	0.05
Heptachlor	3	1/14/2008	1/14/2008	4	1	0.02	0.4
Methoxychlor	1	5/22/2001	6/14/2001	31	2	0.17	40
Metolachlor	1	10/17/2007	6/16/2009	29	3	0.17	
Pentachlorophenol	1	5/18/2009	5/18/2009	11	1	0.02	1
Simazine	1	6/18/2008	6/18/2008	36	1	0.2	4

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

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

Contaminant	Number of Detections	Earliest Detect Date	Most Recent Detect Date	Min Concentration	Max Concentration	MCL	SMCL	Units
Alkalinity, Total	1	6/6/2007	6/6/2007	176.4	176.4			mg/L
Arsenic	8	2/21/2002	1/7/2010	0.0001	0.004	0.01		mg/L
Barium	38	8/2/2001	4/26/2011	0.002	0.0902	2		mg/L
Cadmium	7	2/21/2002	9/23/2009	0.00001	0.0032	0.005		mg/L
Calcium	1	6/6/2007	6/6/2007	69	69			mg/L
Chloride	1	6/6/2007	6/6/2007	60	60		250	mg/L
Chromium	20	9/28/2005	1/7/2010	0.001	0.0086	0.1		mg/L
Combined Radium (226 & 228)	2	5/1/2006	5/1/2006	0.1	0.6	5		pCi/L
Combined Uranium	1	1/3/2006	1/3/2006	2.5	2.5	20		pCi/L
Fluoride	43	6/14/2001	12/17/2010	0.056	1.31	4	2	mg/L
Gross Alpha	7	8/2/2001	9/15/2008	1.9	6	15		pCi/L
Gross Beta	4	5/1/2006	9/15/2008	2	5	50		pCi/L
Hardness, Total (As CaCO ₃)	1	6/6/2007	6/6/2007	141	141			mg/L
Iron	1	6/6/2007	6/6/2007	0.09	0.09		0.3	mg/L
Manganese	1	6/6/2007	6/6/2007	0.016	0.016		0.05	mg/L
Nickel	10	5/8/2002	10/29/2009	0.0011	0.022	0.1		mg/L
Nitrate	203	2/22/2001	4/26/2011	1.2	12.8	10		mg/L
Nitrite	1	6/6/2007	6/6/2007	0.012	0.012	1		mg/L
Ph	1	6/6/2007	6/6/2007	7.8	7.8			pH
Radium-226	3	1/3/2006	5/1/2006	0.1	0.6			pCi/L
Radium-228	1	6/6/2007	6/6/2007	0.9	0.9			pCi/L
Radon-222 *	8	8/2/2001	6/6/2007	180	4450	300 / 4,000*		pCi/L
Selenium	8	9/28/2005	1/7/2010	0.0008	0.015	0.05		mg/L
Sodium	46	8/2/2001	4/26/2011	11	105			mg/L
Sulfate	5	8/2/2001	6/6/2007	10	24.6		250	mg/L
Temperature (Centigrade)	1	6/6/2007	6/6/2007	18	18			Deg C
Thallium	3	9/28/2005	9/28/2005	0.00001	0.0002	0.002		mg/L
Total Dissolved Solids (Tds)	1	6/6/2007	6/6/2007	390	390		500	mg/L

* proposed MCL of 300 pCi/L, with alternate of 4,000 pCi/L if Multi-Media Mitigation conditions are met

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

Routine Samples				Repeat Samples			
Number of Samples Collected	Number Positive for Total Coliform	Number Positive for Fecal Coliform	Number Indeterminate	Number of Samples Collected	Number Positive for Total Coliform	Number Positive for Fecal Coliform	Number Indeterminate
3589	0	0	0	0	0	0	0

TABLE 7 Potential Contaminant Sources in the Westminster Area

No.	Potential Contaminant Source	Type
1	Friendship Valley Elementary School	UST (Heating Oil)
2	Bill's Country Produce	UST (Heating Oil)
3	Sheetz Gas Station	UST / OCP Investigation&Remediation Site
4	Westminster Cemetary	Cemetery
5	Direct-To-You Gas Station	UST (Gasoline)
6	Oceanic Gas Station	UST (Gasoline)
7	Car Wash	Discharge to GW
8	Shell Station	UST
9	Concrete / Asphalt	Industrial Site
10	Tevis Oil	Above ground Oil Storage
11	Tevis Oil	Above ground Oil Storage
12	Tevis Oil	Above ground Oil Storage
13	Tevis Oil	Above ground Oil Storage
14	Southern States Gas Station	UST (Gasoline)
15	Car Wash	Discharge to GW
16	Car Lot	Former Gas Station / Car Storage
17	Bowman's Home and Garden Store	Fertilizers/pesticides
18	Admiral Cleaners	Chemical Use
19	Shell Station	UST (Gasoline)
20	Avenue Cleaners	Chemical Use / LRP Site
21	AST - Owner Unclear	Above ground Storage (Diesel?)
22	Citgo Station	UST (Gasoline)
23	Car Wash (Citgo)	Discharge to GW
24	Car Wash (Exxon)	Discharge to GW
25	Exxon Station	UST (Gasoline)
26	Wastewater Treatment Plant	Chemical Use and Wastewater
27	Jiffy Gas Station	UST (Gasoline)
28	Airport Fueling	Above ground Storage (Fuel)
29	Car Wash	Discharge to GW
30	Airport Fueling	UST (Fuel)
31	Salt Storage / Road Maintenance Facility	Above ground Chemical Storage
32	Miller Asphalt	Industrial Site
33	SHA Salt Storage / Road Maintenance Facility	Above ground Chemical Storage
34	SHA Road Maintenance Facility	UST (Fuel)
35	Midas Service Center	Automotive Chemical Use
36	Carroll County Fire Training Center	Above ground PCS
37	Westminster Citgo and Shopping Center	LRP Site / Former Gas Station(s)
38	Westminster Plant	LRP Site / Former Coal Gasification Plant

TABLE 9 Land Use in the Cranberry Branch Watershed, Upgradient of Intakes

Land Use	Area (acres)	Percentage
Agricultural	876.5	55.3%
Barren Land	1.2	0.1%
Commercial / Industrial / Institutional	0.0	0.0%
Forested	295.8	18.7%
Large lot subdivision (agriculture)	90.6	5.7%
Large lot subdivision (forest)	53.0	3.3%
Low / Medium Density Residential	232.9	14.7%
Open Urban Land / Transportation	2.7	0.2%
Water	32.5	2.1%
TOTAL	1,585.3	100.0%

TABLE 10 Source Water Protection Funding Opportunities

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

TABLE 11 Westminster SWPP - Implementation Matrix

Threat	Recommended Action	Estimated Cost *	Funding Sources	Schedule
Releases of Contaminants	Contingency Planning	<\$10,000	General Revenues	within 1 year
	Transfer on-Site Septic to Regional System	---	General Revenues	ongoing
Inappropriate Land Use	Wellhead Protection Ordinance (WHPO)	TBD	General Revenues or Tax/fee dedicated to WHP	within 1 year
	Digital Information/Mapping Resources	---	General Revenues	within 30 days
	Periodic Updates of SWPP	\$15,000 - \$30,000	General Revenues	every 6 years
	Land Acquisition and/or Easement	site-specific	General Revenues Grants/Loans - see Table 9	As opportunities arise
Need for Public Education and Interaction	Public Education through DPW	<\$10,000	General Revenues In-Kind Support	ongoing
	Signage for Recharge Zone	<\$1,000	General Revenues	within 1 year

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

APPENDIX A

**Example
Wellhead Protection Ordinance¹**

**For the City of Westminster,
October, 2013**

**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 City of Westminster. It is provided as a framework and suggestion, only.

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Section 1.0 PURPOSE AND INTENT

WHEREAS, the ground water underlying the community water supply wellhead protection areas is a major source of the City of Westminster'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 City of Westminster; 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 City of Westminster 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 City of Westminster the 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 City of Westminster 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 City of Westminster on a map available for inspection at the office of the City of Westminster 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 City of Westminster (2013, 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 City'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 (name of community) 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 City of Westminster 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 to 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 City of Westminster 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 City of Westminster 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 City of Westminster 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. City of Westminster 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 City of Westminster.

- C. The City of Westminster 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 City of Westminster'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 City of Westminster 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 City of Westminster, 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 City of Westminster.

Section 6.6 Exemptions

The following activities are exempt from regulation under this ordinance as defined below:

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.

5. Designated IT/Air Business Center - That area specifically defined in the Westminster Comprehensive Plan as “Restricted Industrial” and “Planned Industrial” zones, and as contained within the Air Business Park and Westminster Technology Parks (as geographically defined as of September 2013), shall be exempt from the Zone 1 provisions of this ordinance provided that the proposed activities comply with the WHPO development standards for Zone 2 insofar as possible. Prior to Preliminary Plan Approval (Conceptual Approval), the Zoning Administrator must certify that the proposed activities will not excessively impair water quality or quantity and that the proposal complies insofar as possible with the standards contained within this WHPO. In the event that the Designated Air Business Park and Westminster Technology Parks boundaries or characteristics are changed, expanded, or removed in future Comprehensive Plans, Rezoning, or similar events, this portion of the WHPO shall be revised to ensure that unreasonable impacts to water quality or quantity are avoided.

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 $\text{NO}_3\text{-N}$ 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 City of Westminster, 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 City of Westminster

Q. Alterations and Expansion. The City of Westminster 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 City of Westminster 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 City of Westminster, and to provide updates to the City 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 City of Westminster 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 City of Westminster 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 City of Westminster, 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.