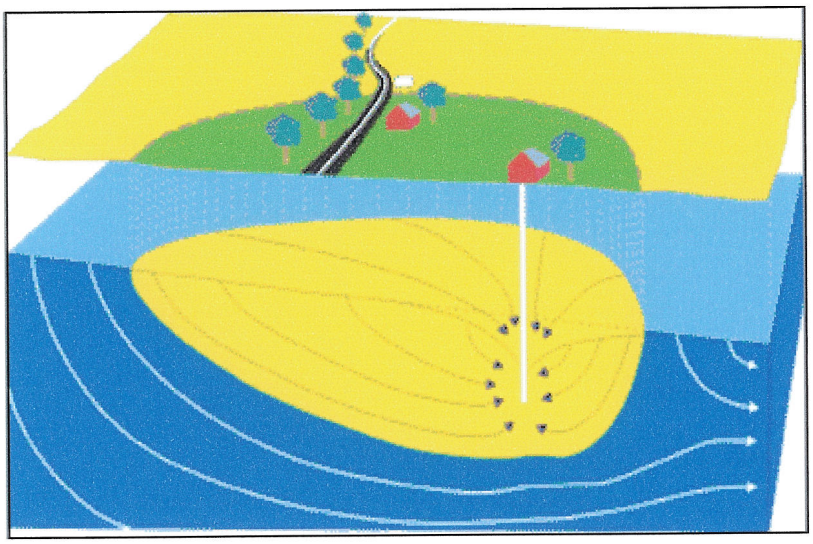
SOURCE WATER ASSESSMENT
for
OUR HOUSE JOB TRAINING CENTER FOR YOUTH
MONTGOMERY COUNTY, MD



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MDE

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SUMMARY

The Maryland Department of the Environment's Water Supply Program (WSP) has conducted a Source Water Assessment for Our House Training Center For Youth (Our House). The required components of this report as described in Maryland's Source Water Assessment Plan (SWAP) are: 1) delineation of an area that contributes water to the source, 2) identification of potential sources of contamination, and 3) determination of the susceptibility of the water supply to contamination. Recommendations for protecting the drinking water supply conclude this report.

The source of Our House's water supply is an unconfined fractured rock aquifer, known as the Sykesville Formation. The system currently uses one well to obtain its drinking water. The Source Water Assessment Area was delineated by the Water Supply Program using U.S. EPA approved methods specifically designed for each source.

Potential sources of contamination within the assessment area were identified based on site visits, database reviews and land use maps. Well information and water quality data were also reviewed. Figures showing land uses and potential contaminant sources within the Source Water Assessment Area and an aerial photograph of the well location are enclosed at the end of the report.

The susceptibility analysis for Our House's water supply is based on a review of the water quality data, potential sources of contamination, aquifer characteristics, and well integrity. It was determined Our House's water supply is not susceptible to contamination by inorganic compounds, volatile organic compounds, synthetic organic compounds, or microbiological contaminants.

INTRODUCTION

The Water Supply Program has conducted a source water assessment for the Our House Job Training Center For Youth (Our House) water supply located approximately 3.5 miles northeast of Gaithersburg in Montgomery County (figure 1). The Our House water supply is considered a nontransient noncommunity (NTNC) water system, which is defined as a public water system that regularly serves at least 25 of the same individuals over six months per year. The system serves water to 15 youths who reside on the property and 20 staff who work there. Our House moved to this site in 2002. Prior to that, this site was used as an alcohol rehabilitation center for a number of years before it closed down.

WELL INFORMATION

Our House is served water by one well. Well information was researched from the Water Supply Program's database, site visits, well completion reports, sanitary survey inspection reports and published reports. No information on the well construction was available. The well existed before the facility was built and was probably drilled prior to 1973, when the State's well construction regulations went into effect, and may not be in compliance with current construction standards. The only information available is that the well is 120 feet deep.

Our House has a Water Appropriation Permit that allows it to use an average of 1,800 gallons per day (gpd) and 2,700 gpd in the month of maximum use. The facility has recently installed a flow meter to measure water use.

HYDROGEOLOGY

Our House is located in the Piedmont physiographic province and is underlain by the Sykesville Formation. This formation is an unconfined, fractured rock aquifer and is composed of gneiss and schist members. The gneiss member is a poorly foliated to massive, fine-to medium-grained biotite-felspar-quartz gneiss. The schist member is finer grained, commonly garnetiferous, very muscovitic, and well foliated (Crowley, 1976). In this type of setting, the underlying crystalline rocks have negligible primary porosity and permeability and ground water is stored in and moves through fractures in the rocks. Ground water flow rates depend upon the openness of the fractures and their degree of interconnection. Unconsolidated overburden (saprolite) above the crystalline rock frequently has much greater primary porosity and permeability than the rock has, allowing additional ground water to be stored (Duigon, 1994). Ground water systems in crystalline rock tend to be localized and flow is within topographic divides towards the nearest perennial streams. (Bolton, 1998).

SOURCE WATER ASSESSMENT AREA DELINEATION

For ground water systems, a Wellhead Protection Area (WHPA) is considered to be the source water assessment area for the system. The source water assessment area for public water systems with an average appropriation amount of less than 10,000 gpd and drawing from fractured-rock aquifers is a fixed radius of 1000 ft around the supply well (MD SWAP, 1999). This radius is based on calculating the land area needed to provide a yield of 10,000 gpd assuming drought recharge conditions of 400gpd/acre, and a safety factor. The total area of the Our House WHPA is 72.37 acres.

POTENTIAL SOURCES OF CONTAMINATION

Potential sources of contamination are classified as either point of non-point sources. Examples of point sources of contamination are leaking underground storage tanks, landfills, ground water discharge permits, large scale feeding operations and Superfund sites. These sites are generally associated with commercial or industrial facilities that use chemical substances that may, if inappropriately handled, contaminate ground water via discrete point location. Non-point sources of contamination are associated with certain types of land use practices such as the use of pesticides, application of fertilizers or animal wastes, or septic systems that may lead to ground water contamination over a larger area.

Point Sources

A review of MDE contaminant databases as well as a field survey revealed no point sources of contamination in the WHPA.

Non-Point Sources

The Maryland Department of Planning's 2002 digital land use map for Montgomery County was used to determine the predominant types of land use in the WHPA (figure 3). Table 2 shows the land use categories within the Our House WHPA. Agricultural Land (cropland, pasture and orchard) makes up the largest portion of the WHPA.

LAND USE CATEGORIES	TOTAL AREA (acres)	PERCENTAGE OF WHPA
Cropland	23.49	32.5
Pasture	17.02	23.5
Orchard	18.62	25.7
Forest	12.31	17.0
Water	0.93	1.3
Total	72.16	100.00

Table 1. Land Use Summary for the Our House WHPA.

Agricultural land is commonly associated with nitrate loading of ground water. It also represents a potential source of SOCs depending on fertilizing practices and use of pesticides.

Maryland Department of Planning's 2004 digital Montgomery County Sewer was used to determine the sewer service area categories in the WHPA (figure 4). Table 2 summarizes the sewer service area categories in the WHPA. About 76.5% of the WHPA, which is, the property owned by Our House is designated immediate priority service area with service within 2 years. The rest of the WHPA has no planned service. Our House has a septic system for wastewater disposal in the WHPA downgradient of the supply well (figure 3). Onsite septic systems may be potential sources of nitrates to the water supply.

SEWER SERVICE AREA CATEGORIES	TOTAL AREA (acres)	PERCENTAGE OF WHPA
No planned service	16.97	23.5
Service within 2 years	55.40	76.5
Total	72.37	100.00

Table 2. Sewer Service Area Summary for the Our House WHPA

WATER QUALITY DATA

Water Quality data was reviewed from the Water Supply Program's database and system files for Safe Drinking Water Act contaminants. The State's SWAP defines a threshold for reporting water quality data as 50% of the Maximum Contaminant Level (MCL). If a monitoring result is at or greater than 50% of a MCL, this assessment will describe the sources of such a contaminant and, if possible, locate the specific sources which may be the cause of the elevated contaminant level. Our House's water supply does not treat the water prior to use, so all the water quality results are representative of untreated water.

A review of the monitoring data since 2002 for Our House's water supply indicates that it meets the current drinking water standards. The water quality sampling results are summarized in Table 3.

	Nitrate		SOCs		VOCs		IOCs (except nitrate)	
PLANT NO	No. of Samples Collected	No. of samples > 50% MCL	No. of Samples Collected	No. of samples > 50% MCL	No. of Samples Collected	No. of samples > 50% MCL	No. of Samples Collected	No. of samples > 50% MCL
01	6	0	1	0	5	0	1	0

Table 3. Summary of Water Quality Samples for Our House's Water Supply.

Inorganic Compounds (IOCs)

No IOCs above 50% of the MCL were detected in Our House's water supply. Nitrate has been detected several times at concentrations ranging from 3.1 to 4.4

ppm with an average of 3.7 ppm. No increasing trends in the nitrate levels have been observed so far. Sodium was also detected one time in a sample collected on March 6, 2003. There is currently no MCL for sodium.

Volatile Organic Compounds (VOCs)

No VOCs above 50% of the MCL have been detected in Our House's water supply.

Synthetic Organic Compounds (SOCs)

No SOCs above 50% of the MCL have been detected in the Member's Club water supply. The only SOC detected one time was di(ethylhexyl)phthalate in a sample collected on March 6, 2003 at 0.4ppb. The MCL for this SOC is 6 ppb. This SOC was also detected in the laboratory blank on the same date and is not believed to be present in the water system.

Microbiological Contaminants

Routine bacteriological monitoring is conducted in the finished water for each noncommunity nontransient water system on a quarterly basis and measures total coliform bacteria. Since Our House has no treatment for its potable water supply, the routine bacteriological samples could represent the aquifer water quality. Total coliform bacteria are not pathogenic, but are used as an indicator organism for other disease-causing microorganisms. A major breach of the system such as due to flooding a well, ruptured water line or back siphonage of contaminated water could cause a positive total coliform result in the distribution system, and would require follow-up total and fecal coliform analysis. Since 2002 Our House has conducted routine bacteriological sampling 10 times. None of the samples had any total colform detections.

SUSCEPTIBILITY ANALYSIS

Our House's well obtains water from an unconfined fractured-rock aquifer. Wells in unconfined aquifers are generally vulnerable to any activity on the land surface that occurs within the WHPA. Therefore, managing this area to minimize the risk to the supply and continued routine monitoring of contaminants is essential in assuring a safe drinking water supply. The susceptibility of the wells to contamination is determined for each group of contaminants based on the following criteria: (1) available water quality data, (2) presence of potential contaminant sources in the WHPA, (3) aquifer characteristics, (4) well integrity, and (5) the likelihood of change to the natural conditions.

In the non-carbonate rocks of the Piedmont region, if a well is constructed properly with the casing extended to competent rock and with sufficient grout, the saprolite serves as a natural filter and protective barrier from microbial contamination. Properly constructed wells with no potential sources of contamination in their WHPA should be well protected from contamination. The

susceptibility of the water supply to the various types of contaminants is summarized in Table 4.

Inorganic Compounds (IOCs)

Nitrate has been detected at levels below 50% of the MCL in Our House's water supply. A review of the nitrate data shows no trends in nitrate levels. Sources of nitrate can generally be traced to land use. Fertilizer applied to cropland and orchards are sources of nitrate loading in ground water. The entire WHPA currently does not have public sewer and has onsite septic systems for wastewater disposal. Onsite septic systems in the WHPA are also sources of nitrate in ground water. Sodium was detected one time at a level well below the heath advisory. Sodium may be naturally occurring in the fractured-rock aquifer.

Based on above analysis Our House's water supply **is not** susceptible to inorganic compounds.

Volatile Organic Compounds (VOCs)

No VOCs have been detected in Our House's water supply. There are no potential sources of VOC contamination in the WHPA. An underground storage tank was removed several years ago.

Based on the above discussion, Our House's water supply **is not** susceptible to VOC contamination.

Synthetic Organic Compounds (SOCs)

No pesticides or herbicides were detected in the sample collected in March of 2003. The one compound detected, di(ethylhexyl)phthlate was also detected in the laboratory blank and is not believed to be present in the water supply. Based on these results, and MDE's review of data from many other wells in Maryland in rural areas, Our House's water supply is **not** susceptible to SOC contamination.

Microbiological Contaminants

Since 2002, 11 bacteriological samples have been collected for Our House's water supply. No total coliform bacteria have been detected in any sample. Since the system does not have any treatment these sample represent the raw water. Onsite septic systems can be source of microbiological contaminants. But water quality data indicate that the water supply has not been impacted by them.

Based on the above discussion, Our House's water supply **is not** susceptible to microbiological contaminants.

CONTAMINANT TYPE	Are Contaminant Sources present in the WHPA?	Are Contaminants detected in WQ samples at 50% of the MCL	Is Well Integrity a Factor?	Is the Aquifer Vulnerable?	Is the System Susceptible to the Contaminant
Nitrate	YES	NO	NO	YES	NO
Inorganic Compounds (except nitrate)	NO	NO	NO	YES	NO
Volatile Organic Compounds	NO	NO	NO	YES	NO
Synthetic Organic Compounds	YES	NO	NO	YES	NO
Microbiological Contaminants	YES	NO	NO	NO	NO

Table 4. Susceptibility Summary for Our House's water supply.

MANAGEMENT OF THE WHPA

Well Inspection/Contaminant Management

- Periodic inspections and a regular maintenance program for the supply well will ensure its integrity and protect the water supply from microbial contaminants.
- Ensure that any storage of pesticides and fertilizers does not present a risk to ground water. Users of such products need to follow label directions.
- Agricultural producers should be encouraged to follow Best Management Practices for the cropland and orchard areas of the WHPA.

Cooperative Efforts with Other Agencies

- Work closely with Montogomery County Heath Department to identify any unused wells in the WHPA and to ensure that they are abandoned and sealed in compliance with the State's well construction standard

Monitoring

- Continue to monitor for all Safe Drinking Water Act contaminants as required by MDE.
- Monitoring the nitrate and SOC data to determine and increase in concentrations or detections.

Changes in Use

- Any increase in pumpage or addition of new wells to the system may require revision of the WHPA. The system is required to contact the Water Supply Program when an increase pumpage is applied for or when new wells are being considered.

REFERENCES

Bolton, David W., 1996, Network Description and Initial Water-Quality Data from a Statewide Ground-Water Quality Network in Maryland: Maryland Geological Survey Report of Investigations No. 60, 167 p.

Crowley, William P., 1976, The Geology of the Crystalline Rocks near Baltimore And it's bearing on the evolution of the Easter Maryland Piedmont: Maryland Geological Survey Report of Investigations No. 27, 40 p.

Dingman, R. J., and Meyer G. M., 1954, The Water Resources of Howard and Montgomery Counties: Maryland Department of Geology, Mines and Water Resources Bulletin 14, 260p.

Maryland Department of the Environment, Water Supply Program, 1999, Maryland's Source Water Assessment Plan, 36 p.

U.S. Environmental Protection Agency, 1991, Delineation of Wellhead Protection Areas in Fractured Rocks: Office of Water and Drinking Water, EPA/570/9-91-009, 144 p.

OTHER SOURCES OF DATA

Water Appropriation and Use Permit: MO1989G006
Public Water Supply Inspection Reports
MDE Water Supply Program Oracle Database
MDE Waste Management Sites Database
Department of Natural Resources Digital Orthophoto Quarter Quadrangles: Sandy Spring
USGS Topographic 7.5 Minute Sandy Spring Quadrangle
Maryland Department of Planning 2002 MontgomeryCounty Land Use Map
Maryland Department of Planning 2004 Montgomery County Sewer Map

FIGURES

Figure 2. Wellhead Protection Area for Our House with Potential Contaminant Sources

LEGEND

- Supply Well
- Onsite septic
- Wellhead Protection Area

1000 0 1000 Feet

N

Base Map: USGS 7.5 minute topographic quadrangle: Sandy Spring

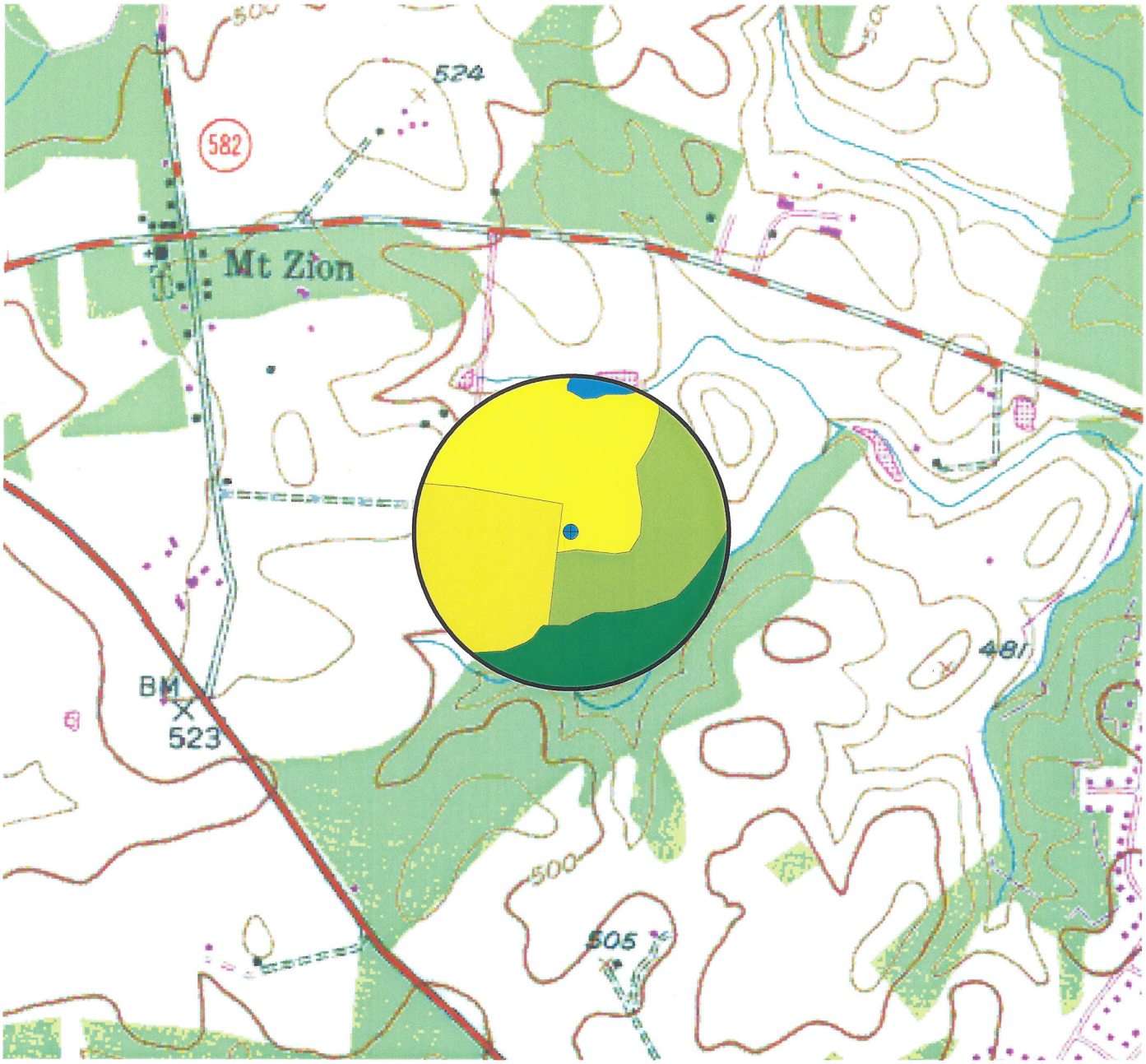

Figure 3. Land Use within Our House's Wellhead Protection Area

LEGEND

Land Use Categories

- Cropland
- Pasture
- Orchards
- Forest
- Water
- Wellhead Protection Area
- Supply Well

1000 0 1000 Feet

N

Base Map: USGs 7.5 minute topgraphic quadrangle : Sandy Spring
Land Use: Maryland Dept. of Planning (2002)

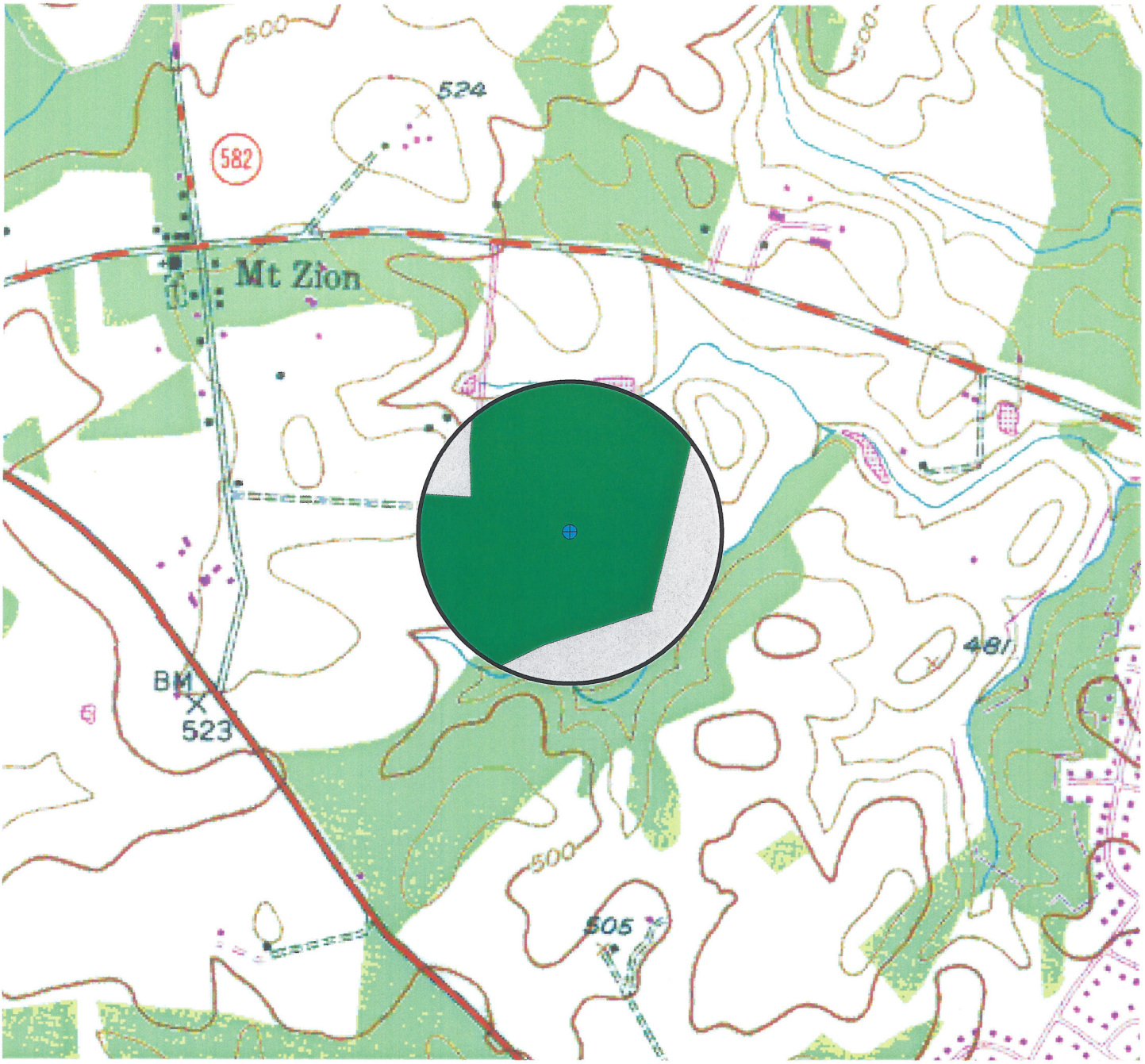

Figure 4. Sewer Service Categories in Our House's Wellhead Protection Area

LEGEND

Sewer Service Categories

- No Planned Service
- Service within 2 years
- Wellhead Protection Area
- Supply Well

1000 0 1000 Feet

N

Base Map: USGS 7.5 minute topographic quadrangle: Sandy Spring
Sewer Service: Maryland Dept. of Planning (2004)