SOURCE WATER ASSESSMENT FOR GROUNDWATER SUPPLIES SERVING TRANSIENT NON-COMMUNITY SYSTEMS IN EASTERN HOWARD COUNTY, MARYLAND

ALWI Project No. HO7S475

June 16, 2005

Prepared for

THE MARYLAND DEPARTMENT OF THE ENVIRONMENT

PURSUANT TO THE REQUIREMENTS OF THE

1996 AMENDMENTS OF THE SAFE DRINKING WATER ACT

Advanced Land and Water, Inc.
Global Environmental Solutions
7540 Main Street, Suite 7 • Sykesville, MD 21784
PHONE 410-795-4626 • FAX 410-795-4611 • www.alwi.com

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Reviewed and Approved By:

Mark W. Eisner, P.G.
President

Prepared and Submitted By:

David L. Pielmeier
GIS Analyst/Staff Scientist

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EXECUTIVE SUMMARY

Advanced Land and Water, Inc. (ALWI) was retained by the Maryland Department of the Environment (MDE) to prepare a source water assessment (SWA) for 31 groundwater wells serving 21 Transient Non-Community (TNC) public supplies located in eastern Howard County, Maryland. This SWA was prepared in accordance with the 1999 MDE Source Water Assessment Plan (SWAP).

Herein, ALWI delineates SWA areas that follow the 1999 MDE SWAP. Within SWA areas, we identify and map existing and potential contaminant hazards, assess the susceptibility of the subject wells to contamination, and formulate specific strategies to reduce the future risk of contamination.

ALWI found that some of the wells are susceptible to bacteriologic contaminants, and by extension, possibly viral and protozoan contaminants as well. Many wells also are susceptible to nitrate-nitrogen contaminants. Other conditions of susceptibility may also be present; with few exceptions, only bacteriologic and nitrate sampling results were available for review because of limits on TNC water quality monitoring requirements.

We identified several instances of seemingly incompatible land uses proximal to one or more of the wells, where changed or relocated operations could mitigate the future risk of contamination. To the degree that they seem practical to implement, appropriate suggestions have been offered on a hazard-specific basis. Generally, our recommendations for improved wellhead protection include hazard reduction measures, wellhead integrity maintenance, contingency planning, customized water quality sampling protocols, contaminant release response protocols and public awareness in the form of focused outreach to the well owners.

1.0 INTRODUCTION

Advanced Land and Water, Inc. (ALWI) was retained by the Maryland Department of the Environment (MDE) to prepare source water assessments (SWAs) of Transient Non-Community (TNC) groundwater supplies located in Frederick and Howard Counties, Maryland. The work was funded and prepared for the Water Supply Program of MDE.

ALWI Proposal Nos. FR7S575 and HO7S475 were authorized by MDE on February 12, 2004. This source water assessment and wellhead protection plan then was developed pursuant to our contract with MDE, with references to the 1999 MDE Source Water Assessment Plan (SWAP).

1.1 REGULATORY FRAMEWORK

The Safe Drinking Water Act (SDWA) of 1974 required the U.S. Environmental Protection Agency (EPA) to develop enforceable drinking water quality standards to protect public health. In 1986, amendments made to the SDWA strengthened provisions for the protection of underground sources of drinking water. These amendments included provisions for establishing Wellhead Protection Programs by individual states under "umbrella" EPA oversight.

The EPA approved MDE's Wellhead Protection Program in June 1991. The 1996 Amendments to the SDWA required Maryland (and other states) to develop SWAs. On an individual system basis, the SDWA provides guidance for an approvable system-specific SWA. Wellhead protection programs and system-specific SWAs, therefore, are related in design and purpose.

As aforementioned, ALWI's work was designed and executed following the 1999 MDE SWAP. Authorized tasks included SWA area delineations, contaminant hazard identification, susceptibility analyses, and recommendations regarding the implementation and management of the SWA areas.

1.2 BACKGROUND INFORMATION

Before or shortly after the outset of our work, MDE provided baseline information from which ALWI gleaned the following background information to aid the development of this plan:

1. **Number and Type of Systems -** ALWI's overall SWAP work covered 157 TNC groundwater supply systems in Frederick County, and 56 TNC groundwater supply systems in Howard County. Community systems, non-transient systems and unclassified systems that serve very small populations were excluded from consideration herein.

2. **Number of Sources Per System -** Most systems subject to this SWA withdraw groundwater from a single on-site well. Some of the systems use more than one well, manifolded together. The source water assessments for TNC surface water intakes, if any exist were excluded from our contract.

3. **Regional Distribution of SWA Data -** Because a singular report covering all subject systems would be voluminous and unwieldy, ALWI judged it beneficial to subdivide the system list geographically and geologically. This approach resulted in a relatively even

distribution of systems across three regions in Frederick County and two in Howard County. The focus of this report is the eastern Howard region (Figure 1), which geologically is dominated by metasedimentary and igneous rocks (see Section 2.2). In total, there exist 31 wells serving 21 individual systems in this region (Table 1).

4. **Groundwater Withdrawal Rates** - The subject systems withdraw varying quantities of water. The approximate amount of water being used is known for systems permitted through the MDE Water Appropriation Program. MDE estimates groundwater withdrawal amounts, based on applicant and permittee interviews and submitted site plan data. Systems without permits generally are un-metered and water use is not known. MDE knew that getting accurate pumping information from these types of systems would be nearly impossible. A generic SWA area was developed by MDE to be used for all transient water systems pumping less than 10,000 gallons per day (gpd) from fractured rock aquifers. The delineation methodology is specified in the 1999 MDE SWAP. The generic SWA area directs a circle centered on the well with a 1,000 foot radius (see section 3.0). The generic SWA area errs on the side of conservatism to help ensure that the SWA area is large enough for all small systems where the groundwater withdrawal is unknown.

2.0 HYDROGEOLOGIC FRAMEWORK

A scientifically sound and well-reasoned SWA area delineation is key to effective wellhead protection. For this reason, ALWI began its technical work by evaluating the hydrogeologic framework underlying the groundwater recharge areas contributing to the subject production wells. We used published information from the United States Geological Survey (USGS), and the Maryland Geological Survey to identify and describe the characteristics of the local hydrogeologic setting. As aforementioned, we also obtained records from MDE and the Howard County Health Department (HCHD) to help confirm specific information regarding the wells that are the subject of this SWA.

2.1 SITE TOPOGRAPHY

According to the USGS 7.5-minute series topographic quadrangle maps for eastern Howard County, regional elevations generally range from 100 feet above mean sea level, near the eastern edge of Howard County, to approximately 600 feet above mean sea level in the western portion of the region. Otherwise in the study area, the land surface is typified by flat to gently sloping terrain. Regionally, most broad hills and subtle valleys appear to trend northeast/southwest, parallel to geologic strike.

2.2 GEOLOGY/HYDROGEOLOGY

Eastern Howard County is almost entirely within the Piedmont province. The western boundary for this region is the north-south trending Plummers Island fault, and the eastern boundary is the Howard County line. The southeastern edge of eastern Howard County contains Coastal plain sediments, which are in contact with the crystalline basement rocks of the Piedmont (Cloos, 1964). The rock formations found within eastern Howard County are a combination of sedimentary, igneous and metasedimentary rocks. The major geologic formations within eastern Howard County, from youngest to oldest, are described as follows (all geologic descriptions from Edwards, 1993):

- ☐ Baltimore Gneiss - The Precambrian aged Baltimore Gneiss is primarily banded gneiss consisting of light pink to pale tan gneiss, interlayered with schistose, dark gray to black biotite-microcline-quartz-plagioclase gneiss. Augen gneiss may occur locally, with zones of interlayered hornblende gneiss and amphibolites less commonly occurring.

- ☐ Baltimore Complex - The Baltimore Complex consists of green to dark greenish-gray and black plagioclase-hornblende amphibolite formation, and is either Precambrian or Cambrian in age.

- ☐ Loch Raven Formation - This formation, along with the Baltimore Gneiss, is the dominant formation found in the western portion of the Eastern Howard County region. It is Cambrian aged and composed of medium to dark gray, biotite-plagioclase-garnet-muscovite-quartz-schist. Locally this formation includes minor biotite quartzite. It can be interlayered with the Oella Formation and contain layers and lenses of dark-green to black epidote-amphibolite.

- ☐ Sykesville Formation - The Sykesville Formation, which is Ordovician aged, is characterized by light to medium gray, muscovite-biotite-plagioclase-quartz gneiss or fels. It can contain cobble-to granular size clasts and slabs of schist and vein quartz. There is a biotite-plagioclase-quartz-muscovite schist member associated with this formation that is medium gray to brownish-gray in color.

Intrusive igneous rocks, Silurian and Jurassic aged, are found in small quantities throughout the region. Light-gray to pinkish-gray pegmatite and dark greenish-gray to black basalt and diabase can occur in the form of dikes, or pods in eastern Howard County.

2.3 AQUIFER RECHARGE

Precipitation infiltrating through the soil, particularly near and up-gradient of the subject wells, is the primary source of aquifer recharge. Generally, overlying soil horizons act to absorb and then slowly release infiltrating precipitation. A portion of the precipitation percolates downward through the soil mantle and then may migrate through narrow, interconnected joints, fractures, faults and cleavage planes in the bedrock.

2.4 WATER QUALITY AND CONTAMINATION RISK

Groundwater within eastern Howard County generally is considered suitable for consumption. Nitrate concentrations tend to be elevated as a consequence of historic agricultural activities atop underlying geology regimes subject to this assessment, but generally remain below the drinking water standard. Regionally, the groundwater generally has favorable secondary (aesthetic) characteristics. A discussion of the quantitative susceptibility of the groundwater to contamination, as indicated from the available water quality records, is provided in Chapter 5 herein.

Certain wells in eastern Howard County could be particularly vulnerable to contamination hazards in areas where major fracture zones occur. A majority of the wells in eastern Howard

County are completed within metasedimentary and igneous rocks, which can contain bedrock fracture zones (where present) that can function as both downward and lateral water conduits. As a result, fracture zones receive and transmit water at a rate higher than would otherwise be available in unfractured areas. Recharge features and wide flow paths may limit natural filtration processes.

3.0 SWA AREA DELINEATIONS

In accordance with the 1999 MDE SWAP, ALWI delineated the areas surrounding the subject wells using the fixed radius method. The 1999 MDE SWAP specifies a 1,000 foot radius, based on an assumed drought-year recharge rate of 400 gpd per acre and an assumed withdrawal rate as high as 10,000 gpd. As discussed in Section 1.2, for most of the systems the withdrawal rate is far less than 10,000 gpd. This creates an adequate safety factor. The resultant delineations are summarized in detailed maps presented in Appendix A.

4.0 CONTAMINANT THREATS ASSESSMENT

ALWI identified existing and potential contaminant sources within each SWA area. The techniques used for identifying a hazard included spatially indexed database reports, regulatory inquiries, field observations and personal interviews. The SWAP suggests that the following potential contamination point sources be inventoried and mapped, for groundwater sources:

- Sites/facilities that hold groundwater discharge permits;
- Land disposal sites, such as landfills, certain less formal refuse disposal areas, and trenched sludge disposal sites;
- Underground storage tanks (USTs), including release sites and fuel lines;
- Coal mining areas; and
- Areas prone to salt water intrusion (none exist in eastern Howard County).

Herein, we collectively term these "SWAP-classifiable point-source hazards." Other possible point-sources of groundwater contamination also may exist. Only those deemed SWAP-classifiable required specific identification and mapping for compliance with the 1999 MDE SWAP. ALWI identified potential contamination hazards in stepwise fashion in the order of the report subsections within this Chapter.

4.1 REGULATORY DATABASE REVIEWS

ALWI began the process of identifying potential point-source contamination hazards by acquiring a spatially indexed list of SWAP-classifiable point source hazards from MDE. Among other regulatory information[1], the MDE listing provides spatially indexed information on

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[1] MDE also provided other information (e.g., facilities where hazardous waste is generated and/or stored), not specifically germane to this SWA as set forth in the SWAP.

regulated landfills, UST and leaking UST facilities, groundwater discharge permittees, petroleum release sites, trenched sludge disposal sites, pesticide dealers and regulated dumpsites.

4.2 FIELD RECONNAISSANCE

Guided by the MDE databases, ALWI performed a visual reconnaissance of publicly accessible portions of each wellhead and surrounding SWA area to observe wellhead conditions, facilities or land use practices potentially constituting a SWAP-classifiable point-source contamination hazard. Pertinent information regarding existing and potential SWAP-classifiable point source contamination hazards (mapped within Appendix A) were noted (Table 2).

Wellhead locations and on-site, point-source contamination hazards were mapped using differentially-correcting Global Positioning System (GPS), capable of acquiring data with sub-meter precision (see Section 4.3). Off-site contamination hazard locations were mapped from the subject parcel(s) and public rights-of-way, resulting in mapping locations with a level of precision meeting or exceeding contract requirements[2], but without engendering trespass concerns.

ALWI observed each wellhead to the degree exposed and observable without excavation, confined-space entry, or other exposure to unusual personal hazards. Most of the subject wells appeared to possess good physical integrity at the wellheads (exceptions noted in Table 2), though no subsurface or invasive work of a confirmatory nature was performed. In nearly all cases, no visual evidence of existing, direct contamination to the wells was observed.

Subject wellheads generally were observed in outdoor locations, with casing stickup and pitless connections. Observations of potential concern at the wellheads and/or within the delineated SWA areas are summarized in Table 2; referenced photographs are contained within Appendix B (see enclosed disc).

4.3 SUMMARY CLASSIFICATIONS OF WELLHEAD HAZARDS OBSERVED

Design, construction and present condition are important factors in determining the contamination susceptibility of a well. Certain observations, warranting consideration, concern, and/or improved practices, were as follows:

1. **Wellheads in Frost Pits, Vaults and Other Manmade Enclosures** - ALWI observed three subject wells (PWSID Nos. 1131012, 1131092 (01) and 1131026 (01)) that were concealed in some fashion (e.g., vaults, locked bunkers, concrete enclosures, buried underground, etc). For this certain system the top of the casing may terminate in a non-watertight subsurface vault, in apparent violation of several provisions[3] within COMAR 26.04.04.07F. If such a well were bacteriologically contaminated (see Chapter 5.0), the bacteria and potentially

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[2] ALWI used a handheld GPS unit, capable of acquiring data at a precision level of 3-15 meters, which satisfied contract specifications. Differential correction would have provided a false aura of accuracy, given that the GPS unit was operated at locations remote from the identified, private-property hazards.

[3] This regulation prohibits frost pits, requires pitless adapters, and specifies that the finished height of well casings extend at least eight inches above natural grade.

associated pathogenic organisms could enter the well through open ports in its sanitary seal.

2. **No Well Tag** - Design, construction and present condition are important factors in determining a well's susceptibility to contamination. However, no well tag was visible for many of the subject wells. For those, ALWI could not assess the initial design or present condition of the casing or grout seal.

3. **Missing, Loose or Ajar Caps** - In one instance (PWSID No. 1131094), the well was equipped with a conventional pitless-style cap of the type that can sometimes allow insects or other potentially pathogenic organisms to enter the well. An upgrade to a more modern cap would provide greater protection against microbial contamination.

4. **Indoor Wellheads** - In a few instances (PWSID Nos. 1131043 and 1131092 (01)) the well was contained in a building. There was no observed hatch in the above ceiling or the roof that would allow easy access should the pump need to be serviced.

4.4 SUMMARY CLASSIFICATIONS OF POINT SOURCE HAZARDS OBSERVED

In addition to the wellhead reconnaissance and hazard identification, ALWI also performed a field reconnaissance from public rights-of-way within the SWAs. Readily-observable point-source contamination hazards, of a SWAP-classifiable nature, included the following:

1. **Underground Storage Tanks** - Several subject TNC systems had UST facilities within the corresponding SWA (see Table 2). Surficial and subsurface fuel spills from such USTs are possible, even if the facilities are within regulatory compliance standards. Based on comparable experience, ALWI has observed that UST sites may achieve compliance and pass leakage detection tests even with low to moderate degrees of subsurface petroleum contamination. Given the proximity of the UST field to the well, analytical testing to confirm the absence of gasoline and diesel fuel constituents (e.g., benzene, toluene, ethylbenzene, xylene, methyl-tertiary-butyl ether [MTBE], naphthalene), and totals for both gasoline- and diesel-range petroleum hydrocarbon compounds seems appropriate[4].

2. **Highway and Parking Area Deicing** - Highway and parking area deicing practices may increase a seasonal risk of sodium and chloride contamination. The State Highway Administration is unlikely to curtail or otherwise change deicing practices on nearby state and federal highways. However, consideration should be given to using non-chemical abrasives on the private parking lots for deicing to the degree possible.

Table 2 contains identified SWAP-classifiable hazards, sorted by the TNC system potentially affected. In many cases, the existence of a potential contamination hazard (i.e., its listing on a regulated facilities database) is an incidence of environmental compliance and does not itself indicate or imply an existing contaminant release.

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[4] Any finding of petroleum-contaminated groundwater must be reported to the MDE Oil Control Program. Such a report would open (or reopen) an Oil Control Program case file. MDE Oil Control Program representatives may order additional sampling, UST tightness testing, UST removal(s), monitoring well drilling, and/or other investigative and remedial measures. ALWI suggests that site ownership and HCHD interests consult legal counsel before taking any action that could have adverse financial or environmental liability consequences.

4.5 NON-POINT SOURCE CONTAMINATION HAZARDS AS SUGGESTED BY LAND USE

The 1999 MDE SWAP suggests consideration and mapping of the following classifications of land use within the SWA areas: low, medium and high density residential, institutional, open urban land, industrial, commercial, crop land, pasture, deciduous forest, evergreen forest, mixed forest, brush, water, and agricultural building. Additionally, the 1999 MDE SWAP recommends that the extent of community sewer service areas be mapped, if within SWA areas.

ALWI obtained countywide land use and community sewer Geographic Information Systems data and maps from MDE and the Maryland State Office of Planning. Pertinent land use acreages and percentages, within the SWA areas, are listed in Figure 2. Dominant land uses within the SWA areas are agricultural lands, forests, existing residential areas and public lands (Figure 2).

Figures A-1 through A-5 (Appendix A) also depict the approximate extent of public sewer service within and near affected SWA areas. No land within any SWA area in eastern Howard County existed in public sewer service areas. Property owners may discharge inappropriate liquid wastes, down the drain or onto the ground. In the former case and absent a public sewer system, the drain connects to a septic system and thus, to the local groundwater aquifer.

4.6 RESOLUTION OF CONFLICTING DATA

In certain instances, the information that we received from various sources (i.e., the MDE databases, field observations, system owner interviews, etc.) appeared in internal conflict. For example, the MDE databases may indicate that two wells were on a single system, but during our reconnaissance the system owner verified that there was only one well serving the system. Some systems had additional wells that were not recorded in the MDE database. ALWI has included these additional wells in the updated database. Although these circumstances were few, they posed special challenges when they arose.

To help resolve these issues, ALWI contacted the HCHD for clarifications. HCHD sanitary surveys, were reviewed for those systems where information otherwise appeared internally contradictory (Appendix C). Using the sanitary surveys and presuming them to be definitive, most ambiguities and inconsistencies were resolved.

Within eastern Howard County, there were two instances where one of the wells listed in the MDE database, associated with that particular system, had recently been abandoned (PWSID Nos. 1131030 and 1131071).

Additional wells, not presently recorded in the MDE database, are associated with systems PWSID Nos. 1131102 (02), 1131101 (02), 1131026 (02) and 1131108 (02).

5.0 QUANTITATIVE ASSESSMENT OF CONTAMINANT SUSCEPTIBILITY

Building Consultants Incorporated (BCI), a woman-owned subconsultant working under ALWI's direct and continuous supervision, completed a review of available groundwater quality records to support an assessment of groundwater susceptibility as described in the 1999 MDE SWAP.

5.1 PROCEDURES

The susceptibility assessment depended on electronic databases furnished by MDE (synthesized in Appendix D), and other water quality records furnished by MDE, our past overall experience in projects of this nature and in working as a hydrogeological consultant for public and private concerns within the subject area, and the results of the field reconnaissance described in Section 4.2 herein. Generally, the susceptibility assessment was completed in accordance with the following step-wise procedure:

1. **Obtain and Filter Electronic Records** - We reviewed available electronic databases of water quality analyses provided by MDE and extracted pertinent data (Appendix D). The raw databases first were filtered to isolate only TNCs subject of the presently authorized study and within the geographical range of this specific report (i.e., eastern Howard County).

2. **Consider Chemical Classes** - Because the subject systems are TNCs, the furnished databases contained analytical records for bacteriologic and nitrate sampling results. Little, if any information was available for other contaminants.

3. **Identify "Exceedance" Instances** - We defined an "exceedance" as a singular test result indicating Maximum Contaminant Level (MCL). To identify such exceedances, we compared each specific analytical water quality result to published MCLs (in COMAR 26.04.01 as of the date of authorization of this work). Guided by MDE, we judged that a concentration of precisely 50% of a given MCL (i.e., 5 mg/L for nitrate) should be considered an exceedance. Procedurally, this was accomplished by sorting the database on a system-by-system basis by analyte and concentration.

4. **Assess Frequency and Relative Percentage of Exceedance Instances** - The number of times that a given analyte was detected in a concentration greater than 50% of its respective MCL was discerned in terms of overall frequency, percentage of total number of samples and date range of exceedance. Then, for conformance with the MDE SWAP, only those contaminants with 50% of the MCL equaled or exceeded were further evaluated. Certain results that seemed anomalous or otherwise surprising were flagged for a confirmatory file review.

5. **Data Quality Assurance Through File Review at MDE** - On December 13 and 14, 2004, BCI reviewed select hard copy water quality data at MDE offices in Baltimore, Maryland to assure that our findings accurately reflected the whole of the water quality records available at that time. These manually-collated data sources allowed us to verify the accuracy of the databases MDE had previously furnished[5].

6. **Integration** - ALWI then identified correlations between water quality exceedances and specific field observations suggestive of a condition of susceptibility.

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[5] Records predating 1998 were not observable during the time of the review and consequently, the accuracy of said records cannot be guaranteed. According to MDE, the records have been archived and are available for review for any data that may be questionable or inconsistent.

5.2 RESULTS

The available data support an interpretation that many of the subject TNC wells are susceptible, in whole or in part to several compounds, summarized in Tables 3 and 4 and discussed below.

1. **Nitrate** - Many of the wells subject to this assessment were found to be susceptible to nitrate contamination. The wells generally record concentrations approaching the established MCL of 10 mg/L; amounts exceeding the susceptibility threshold of 5 mg/L were more common than not.

2. **Bacteria** - Total coliform bacteria may not themselves be pathogenic, but often are an indicator or screening tool for identifying possible bacteriologic, protozoan and viral contamination. As indicated in Table 3, the raw water within some of the subject wells appears susceptible to bacteria, and therefore also may be susceptible to protozoa and viruses. In some circumstances, however, experience has shown that a condition of apparent bacteriological contamination truly originates from a mere lack of appropriate disinfection prior to sampling.

5.3 LIMITATIONS OF SUSCEPTIBILITY ASSESSMENT

This susceptibility assessment was comprehensive insofar that all available chemical data were evaluated in comparison to 50% of the respective MCL, for each of the subject wells for which data were furnished. Nevertheless, certain limitations of this assessment potentially remain associated with the following:

1. **Treatment Plants vs. Individual Wells** - The databases contain information specific to treatment plants, not necessarily to individual wells. Each chemical class was considered separately for each treatment plant, since composite groundwater samples could not be separated. Where more than one well shares a treatment plant, well-specific information generally was not available on which to base a well-specific evaluation of susceptibility. Blending and other operational protocols may affect well-specific susceptibilities in a manner not discernable through this assessment.

2. **Reliance on Existing Data** - Water samples were not collected and analyzed as a component of this SWA. In addition, the water quality databases that were used to support this assessment revealed sometimes-irregular sampling intervals. MDE advises that the SDWA regulations are such that different contaminants are sampled at different intervals and provide MDE with the authority to reduce the frequency of sampling based on the occurrence of a contaminant in the water supply and geology.

6.0 WELLHEAD AND SWA PROTECTION RECOMMENDATIONS

Chapters 1 through 5 of this report constitute the Source Water Assessment for the eastern Howard County TNC systems, as required under the 1996 SDWA amendments. In concept, the system owners and their customers, tenants and guests benefit from a readily implemented plan for pro-active wellhead protection. Such protection efforts:

1. Provide measures to mitigate public health risks that may otherwise arise due to contamination of the groundwater supplies; and

2. Reduce the risk of future groundwater contamination of both natural and manmade origin.

6.1 WELLHEAD PROTECTION RECOMMENDATIONS; SYSTEM OWNERS AND OPERATORS

Bacteria (total coliform, *e. coli*) are the most common groundwater contaminant that is within the capability of individual system owners and operators to diagnose and correct. Many subject systems had positive bacteria sampling results, at one time or another. Such corrective efforts, therefore, appear warranted.

Based on the generally recurrent positive bacteria results that probably eliminate sample error, ALWI presently believes the elevated bacteria concentrations to be a consequence of incomplete disinfection and/or pervasive anthropogenic bacteria sources. GWUDI determinations and other conclusions seem premature before aggressive shock-chlorination and additional sampling is performed. The causes of bacteriologic contamination may include casing perforations, leakage past the bottom of an incompletely seated casing, debris on the pump column, foreign matter in the well, insects and larvae within the well cap and other sources.

Chlorination and/or ultraviolet disinfection should be considered for those wells wherein bacteriologic contamination persists and wherein potability cannot be restored through redevelopment coupled with aggressive shock chlorination. In the event that GWUDI is confirmed the water system can (1) replace the GWUDI well with a new well, (2) reconstruct or rehabilitate the existing well to a non-GWUDI condition, and/or (3) install filtration that meets EPA/MDE requirements. We note that in some areas it may not be possible to drill a new well, or to rehabilitate a well, that would not still be GWUDI.

Focusing on wellhead maintenance and protection for sanitation and maintenance of a disinfected supply, ALWI offers the following additional recommendations to the individual system owners:

1. **Maintain Integrity of Well and Supply System** - A copy of the HCHD sanitary survey for the well(s) should be obtained and reviewed. Any defects in sanitation should be corrected, and the system should be disinfected following such work. Installing new two-piece well caps with insect-proof screens is a good way to reduce potential bacteriologic contamination from entering the well from its cap. Caulking the electrical conduit also helps to maintain a sanitary seal at the wellhead.

2. **Wells Near USTs** - Wells identified to be at risk from USTs should be sampled for volatile organic compounds annually if no UST releases are verified, or quarterly (or more often if directed by the MDE Oil Control Program) if a release in the SWA has been verified. Corrective action, as necessary, will help protect the health of regular consumers.

3. **Onsite Disconnected Wells** - PWSID No. 1131026 is an unused and disconnected well. Such a well potentially constitutes a short-circuit pathway for the downward migration of

contamination into the aquifer. While the owner may seek to keep the well for emergency or backup uses, COMAR 26.04.04.11.D(2)a requires that unused and unneeded wells be abandoned and sealed. MDE and/or HCHD may wish to consider advising the owner of the potential contamination threat associated with the disconnected well, and to encourage proper abandonment.

4. **Wellhead Vehicular and Tampering Hazard Reduction** - ALWI recommends continued protection of the wellheads from vehicular hazards. We also recommend grading to redirect storm water away from the wellheads. Water treatment chemicals should be stored in secondary containment devices to protect against leaks or spills. All outdoor wellheads not currently protected by locks, bunkers and/or fences should have these or other types of equally protective devices installed.

5. **Dry Cleaning Facilities** - Cleaning solvents associated with dry cleaning facilities can enter the groundwater through the cleaning, purification, and waste disposal stages. These solvents can enter the ground through spills, and leaky tanks, pipes and machines. Proper management of the wastewater or switching to “wetcleaning” can help reduce the potential of groundwater contamination near dry cleaning facilities.

6. **Roadway and Parking Lot Deicing** - The owners of subject TNC wells should be encouraged to use abrasives and calcium chloride formulations as roadway and parking lot deicer. If the data exist, restrictions in the use of conventional road salt should be predicated on existing sodium and chloride concentrations in the aquifer.

7. **Wells in Flood-Prone Areas** - Wells in areas subject to flooding, naturally or from stormwater, should be sampled for total coliform bacteria, *e. coli* and other contaminants following significant rain events (e.g., 0.5 inch in a 24 hour period) to verify the continued potability of the water. Corrective action may be necessary based on the results, including but not restricted to casing extensions, installation of disinfection systems, installation of filtration systems, redirection of floodwaters, and/or abandonment and replacement.

8. **Wells Serving Seasonal Facilities** - Water systems for seasonal facilities, such as campgrounds, should be disinfected and flushed prior to the opening of a new season.

9. **Be Cognizant of Land Use Changes; Participate in Public Processes** - System owners should keep track of potential changes in local zoning and land use within the individual SWA areas that might impact groundwater quality. Participation in public meetings and hearings, on issues such as planning, zoning and development, may help local officials be cognizant of groundwater quality issues and integrate such concerns in decision-making.

In summary, we recommend that tests for total coliform bacteria and *e. coli* be performed on a periodic basis as determined by MDE and HCHD. If treatment is provided, both pre- and post-treatment water should be sampled. Total coliform bacteria testing results are a good indication of the sanitary integrity of the system. *E. coli* analyses help diagnose the specific source and cause of a positive total coliform bacteria result because *e. coli* are present in the feces of warm-blooded animals. All positive results should be investigated, with the cause then corrected. Sources with chronic *e. coli* contamination should be rehabilitated, disinfected and filtered, or abandoned and replaced.

6.2 SWA AREA MANAGEMENT RECOMMENDATIONS; MDE AND HCHD

Many wellhead protection objectives are most commonly achieved via ordinance or restrictive covenant. However, ordinance-based wellhead protection is easier to implement at the municipal scale. ALWI believes that ordinances imposing greater land use restrictions than already within COMAR would be difficult to support, enact and enforce. Within this limitation, we recommend focus on wellhead integrity improvements, materials storage improvements, confirmatory sampling, treatment retrofits where necessary and/or use of bottled supplies in lieu of potentially costly repairs and rehabilitation measures.

6.2.1 Origins of Nitrate - Nitrogen in Groundwater

Nitrates are inorganic compounds that originate as non-point source contamination from the fertilization of farm fields and related practices of agricultural origin. Nitrates also can arise from point sources, such as sewage storage and disposal systems in the SWA areas or in upgradient areas. It is possible that the elevated nitrate concentration recorded for many of the subject TNCs is a combination of both point- and non-point sources.

6.2.2 Nitrate-Nitrogen Hazard Reduction Strategies

Specific recommendations to mitigate the nitrate hazard are provided below. The order of these recommendations reflects ALWI's judgment of their relative benefit:

1. **Enhanced Treatment for New Septic Systems -** Nitrate-nitrogen likely is of anthropogenic origin, suggesting that appropriately conceived and executed strategies may mitigate the hazard and/or reduce risk of contamination. ALWI recommends that the owners of new septic systems within the SWA areas be encouraged to have advanced pre-treatment systems or recirculating sand filter systems.

2. **Community Outreach to Agricultural Land Owners and Tenant Farmers** - MDE and/or HCHD may consider an area-wide community outreach and awareness program, concentrating on agricultural landowners. ALWI recommends that assistance be solicited from local agricultural extension officials in contacting and educating affected parties as to the benefits of adopting nutrient management practices. MDE and/or HCHD also should consider a mass mailing with pertinent information on source reduction and nutrient management, to owners of the subject TNCs, as a measure to educate them on contamination issues.

6.2.3 Household Hazardous Waste Collection Days; Dumping Mitigation

ALWI recommends that MDE and HCHD jointly establish and maintain a program for household hazardous waste collection days. We also recommend that existing informal refuse disposal practices in the SWA areas cease; letters to the affected PWSID owners may accomplish this goal. Any dumping areas or informal vehicle storage area should be cleaned up by the affected property owners to the degree financially feasible.

7.0 CONCLUSIONS

In preparing this SWA report and specifically the conclusions enumerated below, ALWI has utilized its best level of effort consistent with its professional standards, present scientific judgment and knowledge. We have upheld accepted industry practice and prepared this SWA report within the budgetary and work scope limitations set forth in its contract with MDE. Subject to this provision and the assumptions and exclusions specified and mutually agreed in the aforementioned contract and/or referenced herein, ALWI's conclusions follow:

1. **SWA Area Delineations** - In accordance with the 1999 MDE SWAP, ALWI delineated SWA areas around each subject TNC (Table 1) as having a fixed radius of 1,000 feet.

2. **Contamination Hazards** - ALWI identified and catalogued existing and potential contaminant hazards in each SWA area in accordance with the 1999 MDE SWAP. Not all hazards are equal in immediacy, proximity and condition. Hazards are mapped within Appendix A and summarized in Table 2.

3. **Quantitative Susceptibility Assessment** - For the most part, we found that many of the wells are susceptible to nitrate and/or bacteriologic contamination (Tables 3 and 4). Some of the reported bacteriologic concentrations of these contaminants already have risen to levels where proactive rehabilitation and/or treatment seem warranted. In most of the other wells, nitrate concentrations approach or exceed 50% of the respective MCL, wherein continued close monitoring is warranted but treatment seems premature and possibly unnecessary.

8.0 SELECTED REFERENCES

Cloos, E., 1964, History and Geography of Howard and Montgomery Counties in The Geology of Howard and Montgomery Counties, Maryland Geological Survey, 357 p.

Edwards Jr., J., 1993, Geologic Map of Howard County, Maryland, Maryland Geological Survey, 1:62,500.

Maryland Department of Environment, 1999, Source Water Assessment Guidance Document.

United States Environmental Protection Agency, 1974, Safe Drinking Water Act, Amended 1986.

Table 1: Summary Table of Subject TNCs

System Name	PWSID	Source ID	Source Type	Tag Number	Wellhead Integrity	Well Deficiencies	Year Drilled	Aquifer Unit[3]
Belmont Conf. Center Dobbin House	1131003	1	GW	unknown	not visible	underground	unknown	Baltimore Complex
Boarman's Meat Market	1131004	1	GW	unknown	satisfactory	none at wellhead	unknown	Baltimore Gneiss
Foster's Country Store	1131012	1	GW	unknown	satisfactory	enclosed, 2 USTs observed nearby	unknown	Baltimore Gneiss
Crossroads Pub	1131026	2	GW	HO-94-3397	satisfactory	2 USTs and a disconnected well observed nearby	unknown	Loch Raven Formation
Crossroads Pub	1131026	1	GW	unknown	unsatisfactory[1]	uncapped, disconnected well; 2 USTs observed nearby	unknown	Loch Raven Formation
Nixon's Farm	1131030	2	GW	HO-70-0021	satisfactory	none at wellhead	1969	Loch Raven Formation
Nixon's Farm	1131030	3	GW	HO-94-1607	satisfactory	none at wellhead	1998	Loch Raven Formation
West Friendship VFD	1131043	1	GW	unknown	satisfactory	Indoors, 2 USTs observed nearby	unknown	Loch Raven Formation
Rehm's Catering	1131055	1	GW	HO-73-0693	satisfactory	disconnected well and 2 USTs observed nearby	1974	Baltimore Gneiss
Rehm's Catering	1131055	3	GW	HO-92-0485	satisfactory	disconnected well and 2 USTs observed nearby	1993	Baltimore Gneiss
Rehm's Catering	1131055	2	GW	HO-81-1893	not visible	enclosed, disconnected well; 2 USTs observed nearby	1987	Baltimore Gneiss
Schooley Mill Park	1131056	2	GW	HO-94-0647	satisfactory	none at wellhead	1995	Baltimore Gneiss
Schooley Mill Park	1131056	1	GW	HO-94-0646	satisfactory	none at wellhead	1995	Baltimore Gneiss
Schooley Mill Park	1131056	3	GW	HO-81-0951	satisfactory	none at wellhead	1985	Baltimore Gneiss
Station House/Ledos Pizza	1131057	1	GW	HO-81-1682	satisfactory	UST and dry cleaner observed nearby	1986	Loch Raven Formation
Country Corner Snowball Inc.	1131071	1	GW	HO-88-1653	satisfactory	none at wellhead	1991	Baltimore Gneiss
Highs-West Friendship	1131090	1	GW	HO-92-0384	satisfactory	2 USTs and dry cleaner observed nearby	1993	Loch Raven Formation
Belmont Conf. Center Manor House	1131092	2	GW	HO-81-1000	satisfactory	none at wellhead	1985	Baltimore Complex
Belmont Conf. Center Manor House	1131092	1	GW	unknown	not visible	underground	unknown	Baltimore Complex
Waverly Mansion	1131094	1	GW	HO-73-2437	unsatisfactory[1]	loose cap	1977	Sykesville Formation
Highs-Fulton	1131098	1	GW	HO-94-1300	satisfactory	UST and dry cleaner observed nearby	1997	Loch Raven Formation
Evergreen Stables	1131101	1	GW	HO-81-1987	satisfactory	none at wellhead	1987	Loch Raven Formation
Evergreen Stables	1131101	2	GW	HO-81-2161	satisfactory	none at wellhead	unknown	Loch Raven Formation
Belmont Conf. Center Carriage House	1131102	1	GW	HO-94-2336	satisfactory	none at wellhead	1999	Baltimore Complex
Belmont Conf. Center Carriage House	1131102	2	GW	HO-94-2337	satisfactory	none at wellhead	unknown	Baltimore Complex
Dayton Repair Facility Well #1	1131104	1	GW	HO-73-4122	satisfactory	7 USTs observed nearby	1982	Loch Raven Formation
St. Mark's Episcopal Church	1131107	1	GW	HO-88-1918	satisfactory	none at wellhead	1991	Baltimore Gneiss
Mt. Zion UMC	1131108	1	GW	HO-81-0935	satisfactory	none at wellhead	1985	Baltimore Gneiss
Mt. Zion UMC	1131108	2	GW	HO-73-1212	satisfactory	none at wellhead	unknown	Baltimore Gneiss
St. Paul's Lutheran Church	1131109	1	GW	HO-73-3369	satisfactory	UST and dry cleaner observed nearby	1979	Loch Raven Formation
Dayton Repair Facility Well #2	1131110	1	GW	HO-81-0232	satisfactory	7 USTs observed nearby	1983	Loch Raven Formation

[1] See report Section 4.3 for details.

[2] See Table 2 for a more detailed description of the hazards associated with each well.

[3] Aquifer unit determined through the use of *Geologic Map of Howard County* (Edwards, Jr. 1993).

Table 2: Point-Source Contamination Hazards

Associated System Name[1]	Associated PWSID	Regulated Entity (Hazard) Name	Regulated Entity (Hazard) Address	Nature of Hazard[2]	Chemical Class	Figure No.	Figure ID
Foster's Country Store	1131012	Foster's Country Store	11707 Frederick Road, Ellicott City, MD 21042	UST (2)	VOC	A-1	A
Crossroads Pub	1131026	Knollwood Automotive	4828 Ten Oaks Road, Dayton, MD 21036	UST (2)	VOC	A-2	A
West Friendship VFD	1131043	West Friendship VFD	12460 Frederick Road, West Friendship, MD 21794	UST (2)	VOC	A-1	B
Rehm's Catering	1131055	Rehm's Catering	13010 Clarkesville Pike, Clarksville, MD 21029	UST (2)	VOC	A-4	A
Highs-West Friendship	1131090	Highs-West Friendship	12780 Frederick Road, West Friendship, MD 21794	UST (2)	VOC	A-1	C
Highs-West Friendship	1131090	West Friendship Cleaners	12800 Frederick Road, West Friendship, MD 21794	dry cleaner	VOC	A-1	D
Various	1131057, 1131098, 1131109	Fulton Cleaner	Scaggsville Road, Fulton, MD 20759	dry cleaner	VOC	A-5	A
Various	1131057, 1131098, 1131109	Highs-Fulton	11840 Lime Kiln Road, Fulton, MD 21042	UST	unknown	A-5	B
Various	1131104, 1131110	Dayton Repair Facility	4301 Sykesville Road, Dayton, MD 21029	UST (7)	VOC	A-2	B

[1] All hazards in this table were field identified by ALWI during the reconnaissance of each individual wellhead.

[2] The number in parentheses indicates the number of underground storage tanks (USTs) that were observed within the Source Water Assessment area for that particular regulated entity.

Table 3: Bacteriologic Contaminant Susceptibility Table

Site Name	PWSID	Type of Bacteria	Units	Total Samples	Positive Samples	% Positive[1]	Time Period Positive	Max. Conc. Detected	Period of Record	**Interpretive Susceptibility (yes/no)**
Belmont Conf. Center Dobbin House	1131003	Total Coliform	col./100 mL	25	6	24%	1998-2000	89	1996-2003	No
		E. Coli	col./100 mL	25	1	4%	1998	15	1996-2003	
Boarman's Meat Market	1131004	Total Coliform	col./100 mL	16	6	38%	2002	5	1996-2003	Yes
Foster's Country Store	1131012	Total Coliform	col./100 mL	12	1	8%	1996	1	1996-2004	No
Crossroads Pub	1131026	Total Coliform	col./100 mL	8	3	38%	1998	34	1996-2002	Yes
Nixon's Farm	1131030	Total Coliform	col./100 mL	40	19	48%	1996-1999	200	1996-2003	Yes
Rehm's Catering	1131055	Total Coliform	col./100 mL	25	5	20%	2000	101	1996-2004	No
Station House (Ledos Pizza)	1131057	Total Coliform	col./100 mL	19	5	26%	1998-2001	51	1996-2003	Yes
		Fecal	col./100 mL	19	1	5%	2001	4	1996-2003	
Country Corner Snowball Inc.	1131071	Total Coliform	col./100 mL	13	1	8%	1998	6	1996-2003	No
Waverly Mansion	1131094	Total Coliform	col./100 mL	22	2	9%	1999	1	1999-2003	No
Evergreen Stables	1131101	Total Coliform	col./100 mL	16	4	25%	2002-2003	14	1999-2003	Yes

[1] Overall susceptibility to bacteria largely was guided on a 25% occurrence threshold. Those systems with positive results 25% of the time or more generally were deemed susceptible.

Table 4: Chemical Contaminant Susceptibility Table

Site Name	PWSID	Compound > or = 50% of the MCL	Units	MCL (> or =)[1]	50% MCL (> or =)[2]	Total Samples	% Exc.	Time Period > or = 50% of the MCL	Max. Conc. Detected	Period of Record	**Interpretive Susceptibility (yes/no)**
Boarman's Meat Market	1131004	Nitrate	mg/L	**10 (8)**	5 (2)	10	100%	1996-2003	13.2	1996-2003	Yes
Crossroads Pub	1131026	Nitrate	mg/L	**10 (2)**	5 (1)	8	38%	2000-2002	29.5	1996-2003	Yes
West Friendship VFD	1131043	Nitrate	mg/L	10 (0)	5 (7)	8	88%	1996-2003	8.8	1996-2003	Yes
Schooley Mill Park	1131056	Nitrate	mg/L	10 (0)	5 (1)	8	13%	1998	7.7	1996-2003	No
Highs-West Friendship	1131090	Nitrate	mg/L	10 (0)	5 (8)	8	100%	1996-2003	7.9	1996-2003	Yes
Belmont Conf. Center Manor House	1131092	Nitrate	mg/L	10 (0)	5 (5)	6	83%	1998-2003	5.9	1998-2003	Yes
Waverly Mansion	1131094	Nitrate	mg/L	10 (0)	5 (4)	5	80%	1999-2001	9.3	1999-2002	Yes
Belmont Conf. Center Carriage House	1131102	Nitrate	mg/L	10 (0)	5 (1)	4	25%	2002	5.1	2000-2003	Yes

[1] The number in parentheses indicates the number of times the measurements were detected at or above the MCL.

[2] The number in parentheses indicates the number of times the measurements were detected at or above 50% of the MCL and below the MCL.

Global Environmental Solutions
ADVANCED
Land and Water, Inc.

CONFIDENTIAL FACSIMILE TRANSMITTAL SHEET

TO:

FROM: Kayse Fisher

ORGANIZATION: Howard County Health Department

DATE: 8/5/04

FAX NUMBER: 410-313-2648

TOTAL NO. OF PAGES INCLUDING COVER: 2

PHONE NUMBER: 410-313-2640

PROJECT NUMBER: HO7S475

RE: **WELL AND SEPTIC LOCATION**

Hello, here is the request form. If you need any other information feel free to give me a call. Thank you.

Kayse Fisher

7540 MAIN STREET, SUITE 7
SYKESVILLE, MARYLAND 21784
PHONE: (410) 795-4626 FAX: (410) 795-4611

Howard County
Health Department

3525 H Ellicott Mills Drive Ellicott City, MD 21043
(410) 313-2640 Fax (410) 313-2648
TDD (410) 313-2323 Toll Free 1-866-313-6300
website: www.hchealth.org

Penny E. Borenstein, M.D., M.P.H., Health Officer

PUBLIC INFORMATION ACT REQUEST

Property Information: **County #**________

Randall Nixon
Current Owner's Name

2800 Rt. 32, West Friendship, MD
Property Address

Nixons Farms
Subdivision

Lot #________

PWSID#
113 1630

____
All Prior Owner's Name's (if requested or known)

Tax Map______ Parcel #______

Requested Records: (Please check appropriate items)

☐ COMPLETE LOT FILE
☐ SEPTIC CONSTRUCTION PLAN
☒ WELL & SEPTIC LOCATION
☐ OTHER (specify)________
☐ PERCOLATION TEST APP (includes test notes)
☐ WELL COMPLETION REPORT
☐ WELL SAMPLING RESULTS

☐ **Pick-up OR**
☐ **MAIL RECORDS to NAME** Fax to 410-795-4611
ADDRESS________
CITY, ST, ZIP________

I understand that I will be charged $ .60 per page copied. If staff time in record retrieval takes more than two (2) hours, then a fee of $25.00 per hour after two (2) hours will be assessed. Also, I do understand that I will not be able to request any proprietary information enclosed in the file and all copies larger than 11"x17" may best be provided by the proprietor of the document. I also realize that it may take up to thirty (30) days to process this request.

Kayse Fisher
Applicant Name (please print)

410-795-4626
Applicant Phone Number

Kayse Fisher
Applicant Signature

8/5/04
Date

FOR OFFICE USE ONLY

_____ Date Received _____ Date Completed _____ # of Copies Made
_____ No Record Found _____ Preparation Time _____ Staff Initials

APPLICATION

A 16424

P ____________

SEWAGE DISPOSAL TESTING

MARYLAND STATE DEPARTMENT OF HEALTH

HOWARD COUNTY

ELLICOTT CITY

DISTRICT Third

DATE 10/22/71

TO: THE COUNTY HEALTH OFFICER
ELLICOTT CITY, MARYLAND

I, HEREBY, APPLY FOR THE NECESSARY TESTS IN ORDER TO CONSTRUCT (OR RECONSTRUCT) A SEWAGE DISPOSAL SYSTEM.

PROPERTY OWNER John F. Rettaliata

ADDRESS 3765 Church Road , Ellicott City. Md PHONE 465-4920

PROPERTY LOCATION:

SUBDIVISION 2 Mi Route 32 LOT NO. Parcel E

ROAD AND DESCRIPTION Route #32 ½ mile south of Rt. 144 West Freindship

26.722 acres

OCCUPANT ____________ PHONE ____________

PERSON TO CONSTRUCT SYSTEM ____________

ADDRESS ____________ PHONE ____________

SIZE OF LOT 26.722 acres TYPE BLDG. Four
NUMBER OF BEDROOMS

IF NOT SINGLE RESIDENCE DESCRIBE ____________

SIGNATURE OF APPLICANT John Rettaliata

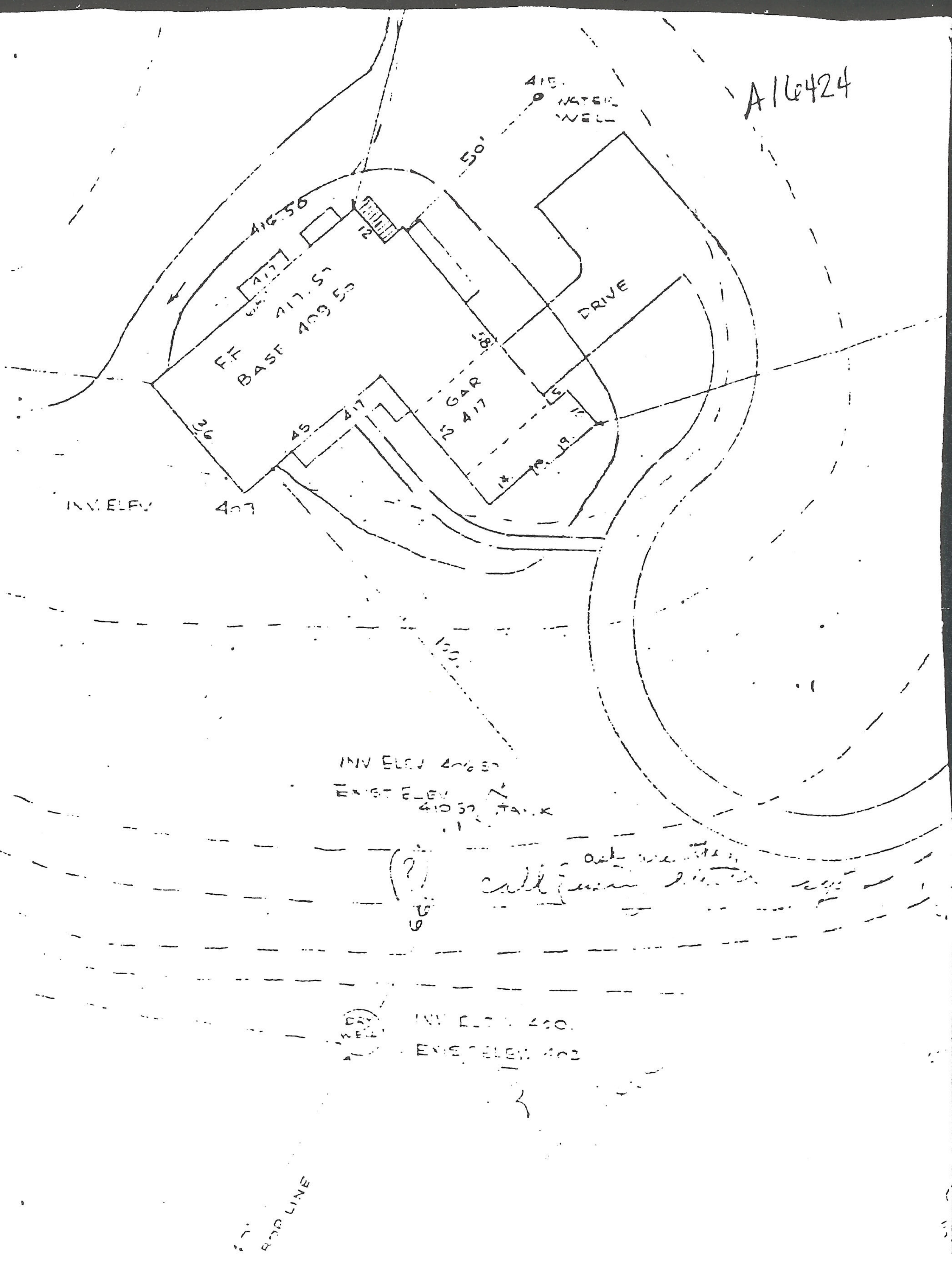
APPROVED BY ____________ FOR Dry Well DATE 12/16/71
(KIND OF SYSTEM)

REJECTED BY ____________ FOR ____________ DATE ____________
(KIND OF SYSTEM)

HOLD PENDING FURTHER TESTS ____________ DATE ____________

REASONS FOR REJECTION OR HOLDING ____________

A16424


416 WATER WELL
50'
416.56
417
FF 417.5?
BASE 409.5?
12
58
DRIVE
GAR
FF 417
26
45
417
14
19
INV ELEV 407
100'
INV ELEV 406.5?
EXIST ELEV 410.5?
TANK
(?)
call
DRY WELL
INV ELEV 400
EXIST ELEV 402
PROP LINE

WR-W-4 3-69

C | 1 | 3102 SEQUENCE NO. (DWR USE ONLY)
1 2 3 (SEQ. NO.) 6
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
DEPARTMENT OF WATER RESOURCES
S.ATE OFFICE BLDG., ANNAPOLIS, MARYLAND 21401
WELL COMPLETION REPORT

THIS REPORT MUST BE SUBMIT WITHIN 30 DAYS AFTER COMPLE. OF THE WELL

FILL IN THIS FORM COMPLETELY

DATE RECEIVED (DWR USE ONLY) 8-13

DATE WELL COMPLETED: Aug 27 69 (15–20)

DEPTH OF WELL: 300 (TO NEAREST FOOT) (22–26)

PERMIT NO. FROM PERMIT TO DRILL WELL: HO-70-0021 (28 29 30 31 32 33 34 35 36 37)

DRILLERS IDENTIFICATION NO. 142

OWNER: NIXON (LAST NAME) ROSEVELT (FIRST NAME)

STREET OR RFD ________ POST OFFICE W FRIENDSHIP MD

WELL DESCRIPTION

WELL LOG

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (USE ADDITIONAL SHEETS IF NECESSARY)	FEET FROM	FEET TO	CHECK IF WATER BEARING
Top soil	0	3	
andy	3	35	
Sand Rock	35	60	
ica	60	90	
ranite	90	200	✓
ica	200	300	

GROUTING RECORD

WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX): YES ☐ Y (46) NO ☐ N (46)

DEPTH OF GROUT SEAL (TO NEAREST FOOT)

FROM 0 FT. (48–52) TO 44 FT. (54–58)

(ENTER 0 IF FROM SURFACE)

CASING RECORD

CASING TYPES — INSERT APPROPRIATE CODE BELOW: ST STEEL; CO CONCRETE; PL PLASTIC; OT OTHER

MAIN CASING TYPE: S T (60 61)
NOMINAL DIAMETER TOP (MAIN) CASING (NEAREST INCH): 6 (63–64)
TOTAL DEPTH OF MAIN CASING (NEAREST FOOT): 44 (66–70)

OTHER CASING (IF USED)

EACH CASING	DIAMETER (INCH)	DEPTH (FEET) FROM	TO

SCREEN RECORD

SCREEN TYPE OR OPEN HOLE — INSERT APPROPRIATE CODE BELOW: ST STEEL; BR BRASS OR BRONZE; HO OPEN HOLE; PL PLASTIC; OT OTHER

C | 2
1 2 3 (SEQ. NO.) 6

EACH SCREEN		DEPTH (NEAREST WHOLE FOOT) FROM	TO
1	8 9	11 15	17 21
2	23 24	26 30	32 36
3	38 39	41 45	47 51
4	53 54	56 60	62 66

SLOT SIZE 1. ______ 2. ______ 3. ______ 4. ______

IF WELL DRILLED WAS A FLOWING WELL CIRCLE BOX 68 ☐ F

DWR USE ONLY (NOT TO BE FILLED IN BY DRILLER)
70 ☐ T TELESCOPE CASING
☐ (E.R.O.) LOG INDICATOR 72
W Q ☐☐☐ OTHER DATA AVAILABLE 74 75 76

C | 3
1 2 3 (SEQ. NO.) 6

PUMPING TEST

HOURS PUMPED (TO NEAREST HOUR): 1 (8–9)

PUMPING RATE (GALLONS PER MINUTE TO NEAREST GALLON): 2 (11–15)

METHOD USED TO MEASURE PUMPING RATE: Bucket

WATER LEVEL: (DISTANCE FROM LAND SURFACE)

BEFORE PUMPING: 70 (NEAREST FOOT) (17–20)

WHEN PUMPING: 300 (NEAREST FOOT) (22–25)

TYPE OF PUMPED USED (CIRCLE APPROPRIATE BOX)

[✓ A AIR] 27 — P PISTON 27 — T TURBINE 27
C CENTRIFUGAL 27 — R ROTARY 27 — O OTHER (DESCRIBE BELOW) 27
J JET 27 — S SUBMERSIBLE 27

PUMP INSTALLED

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX – SEE ABOVE: A, C, J, P, R, S, T, O) 29 ☐

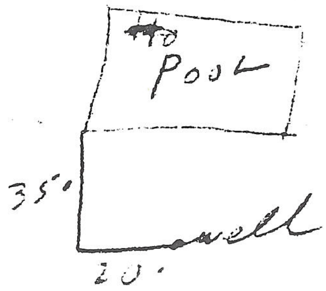
CAPACITY:
GALLONS PER MINUTE (TO NEAREST GALLON) ______ (31–35)
PUMP HORSE POWER ______ (37–41)
PUMP COLUMN LENGTH (NEAREST FOOT) ______ (43–47)

CASING HEIGHT (CIRCLE APPROPRIATE BOX AND ENTER CASING HEIGHT)

[✓ + ABOVE] — BELOW 49 } LAND SURFACE 2 (NEAREST FOOT) (50–51)

LOCATION OF WELL ON LOT

N ↑ SHOW PERMANENT STRUCTURE SUCH AS BUILDINGS, SEPTIC TANKS, AND/OR OTHER LAND MARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL).



CIRCLE APPROPRIATE BOXES

☐ A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

☐ E ELECTRIC LOG OBTAINED

☐ C COPY OF ELECTRIC LOG ATTACHED

HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL ONDITIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND ELIEF.

RILLERS NAME (PLEASE PRINT) L.F. EASTERDAY

IGNATURE L.F. Easterday

Mrs. Nixon is still using
well to be abandoned.
Will abandon well as soon
as she gets pumps out of well.
Betty Mayne

RECEIVED
HOWARD COUNTY HEALTH DEPT.
ENVIRONMENTAL HEALTH

1998 AU 31 AM 8:39

D
RT

THIS REPORT MUST BE SUBMITTED WITHIN
45 DAYS AFTER WELL IS COMPLETED

COUNTY
NUMBER

OK M.D.
8/31/98

PERMIT NO.
FROM "PERMIT TO DRILL WELL"
__ - __ - __ 28 29 30 31 32 33 34 35 36 37

WN ____________________

____________ LOT ____________

s no
☐ N
4 44

B C
45 46

____ ft.
M 58

C O
CONCRETE

O T
OTHER

depth
casing
st foot)

60 61 63 64 66 70

OTHER CASING (if used)
EACH CASING

diameter inch	depth (feet) from	to
____	____	____
____	____	____

screen type or open hole
(insert appropriate code below)

SCREEN RECORD

S T STEEL
B R BRASS BRONZE
H O OPEN HOLE
P L PLASTIC
O T OTHER

C 2
1 2

DEPTH (nearest ft.)

EACH SCREEN

1	8 9	11 15	17 21
2	23 24	26 30	32 36
3	38 39	41 45	47 51

SLOT SIZE 1 ______ 2 ______ 3 ______

DIAMETER OF SCREEN ____________ (NEAREST INCH)
56 60

from to

GRAVEL PACK ____________ ____________

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 ____
68

MDE USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W O

70 ____ TELESCOPE CASING
72 ____ LOG INDICATOR
74 75 76 OTHER DATA

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
D TEST WELL CONVERTED TO PRODUCTION WELL

HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS LIC. NO. M _ D _ _ _

DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. M _ D _ _ _

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

C 3
1 2

PUMPING TEST

HOURS PUMPED (nearest hour) ______ 8 9

PUMPING RATE (gal. per min.) ______ . 11 15

METHOD USED TO MEASURE PUMPING RATE ______

WATER LEVEL (distance from land surface)

BEFORE PUMPING ______ ft. 17 20

WHEN PUMPING ______ ft. 22 25

TYPE OF PUMP USED (for test)

A air 27	P piston 27	T turbine 27
C centrifugal 27	R rotary 27	O other (describe below) 27
J jet 27	S submersible 27	

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. ____ 29

CAPACITY: GALLONS PER MINUTE (to nearest gallon) ______ 31 35

PUMP HORSE POWER ______ 37 41

PUMP COLUMN LENGTH (nearest ft.) ______ 43 47

CASING HEIGHT (circle appropriate box and enter casing height)

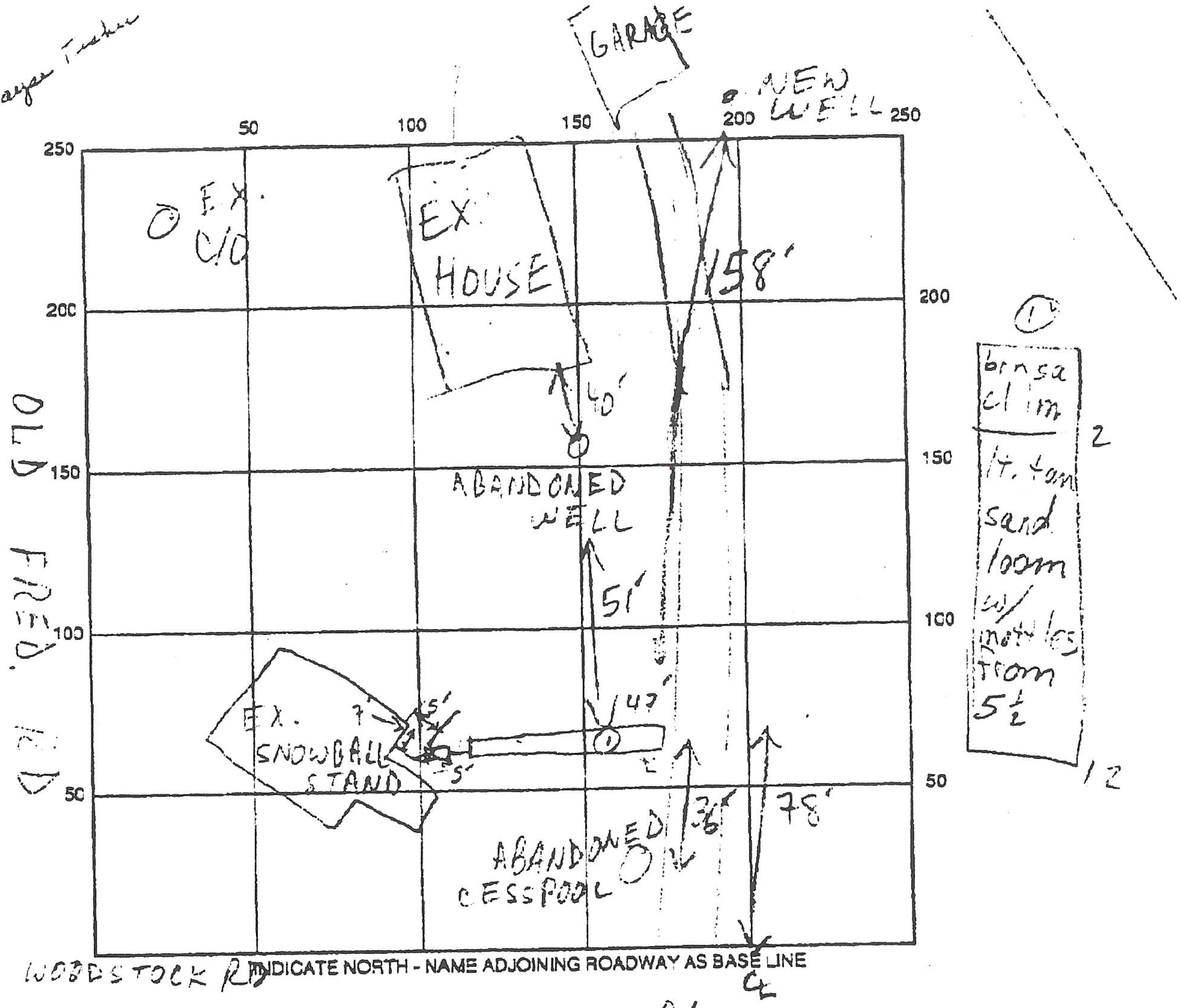
+ above 49
LAND SURFACE
− below 49 ______ (nearest foot) 50 51

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N

Attn: Kaye Tesker



INDICATE NORTH - NAME ADJOINING ROADWAY AS BASE LINE

SEPTIC TANK LEVEL 1000

CLEANOUTS OK

DISTRIBUTION BOX LEVEL —

DRAIN FIELD/TITLE DEPTH 6½ FT.

TRENCH WIDTH 3 FT.

INLET DEPTH 4½ FT.

EFFECTIVE GRAVEL DEPTH 2 FT.

TOTAL LENGTH 47' FT.

NUMBER OF TRENCHES 1

ONE SIDEWALL/BOTTOM AREA 141 SQ. FT.

DRYWALL INSIDE DIAMETER — FT.

EFFECTIVE DEPTH BELOW INLET — FT.

ABSORBENT AREA 141 SQ. FT.

REMARKS: 6/13/91 OK TO STONE + COVER MR

DATE SYSTEM APPROVED 6/13/91

INSPECTOR M. Ritkin

J SEQUENCE NO. (DENV USE ONLY)

TO BE PUNCHED ALL CARDS

STATE OF MARYLAND
WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER Ho 46697

DATE WELL COMPLETED 0 1 [illegible] 9 1

Depth of Well 2 4 0 (TO NEAREST FOOT)

OK MR
2/1/91

PERMIT NO FROM "PERMIT TO DRILL WELL" H O - 8 8 - 1 6 5 3

OWNER [illegible] last name Shirley first name

STREET OR RFD [illegible] TOWN [illegible]

SUBDIVISION [illegible] SECTION [illegible] LOT [illegible]

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Topsoil	0	2	
Br. Mica	2	28	
Tan mica	28	40	
Granite	40	57	
Br. Mica	57	59	✓
Granite	59	73	
[illegible] Mica	73	78	✓
Granite	78	240	

RECEIVED HOWARD COUNTY HEALTH DEPT. 1991 FEB 13

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) [✓ Y yes] N no

TYPE OF GROUTING MATERIAL

CEMENT [✓ CM] BENTONITE CLAY BC

NO. OF BAGS 14 NO. OF POUNDS

GALLONS OF WATER 70

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. TOP to 41 ft. BOTTOM (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
ST	6	46

OTHER CASING (if used) EACH CASING: diameter inch, depth (feet) from, to

SCREEN RECORD

screen type or open hole insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2

EACH SCREEN — DEPTH (nearest ft.)

1	HO	44	240
2			
3			

SLOT SIZE 1____ 2____ 3____

DIAMETER OF SCREEN (NEAREST INCH)

GRAVEL PACK from to

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 ☐

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T ☐ TELESCOPE CASING (E.R.O.S.) ☐ LOG INDICATOR W Q ☐☐☐ OTHER DATA

C 3

PUMPING TEST

HOURS PUMPED (nearest hour) [illegible]

PUMPING RATE (gal. per min. to nearest gal.) 4

METHOD USED TO MEASURE PUMPING RATE [illegible]

WATER LEVEL (distance from land surface)

BEFORE PUMPING 50

WHEN PUMPING [illegible]

TYPE OF PUMP USED (for test): [✓ A air] P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES [✓ NO]

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE ☐

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

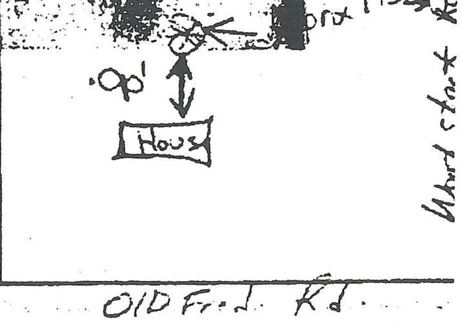
PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height) [✓ + above] − below LAND SURFACE 2 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

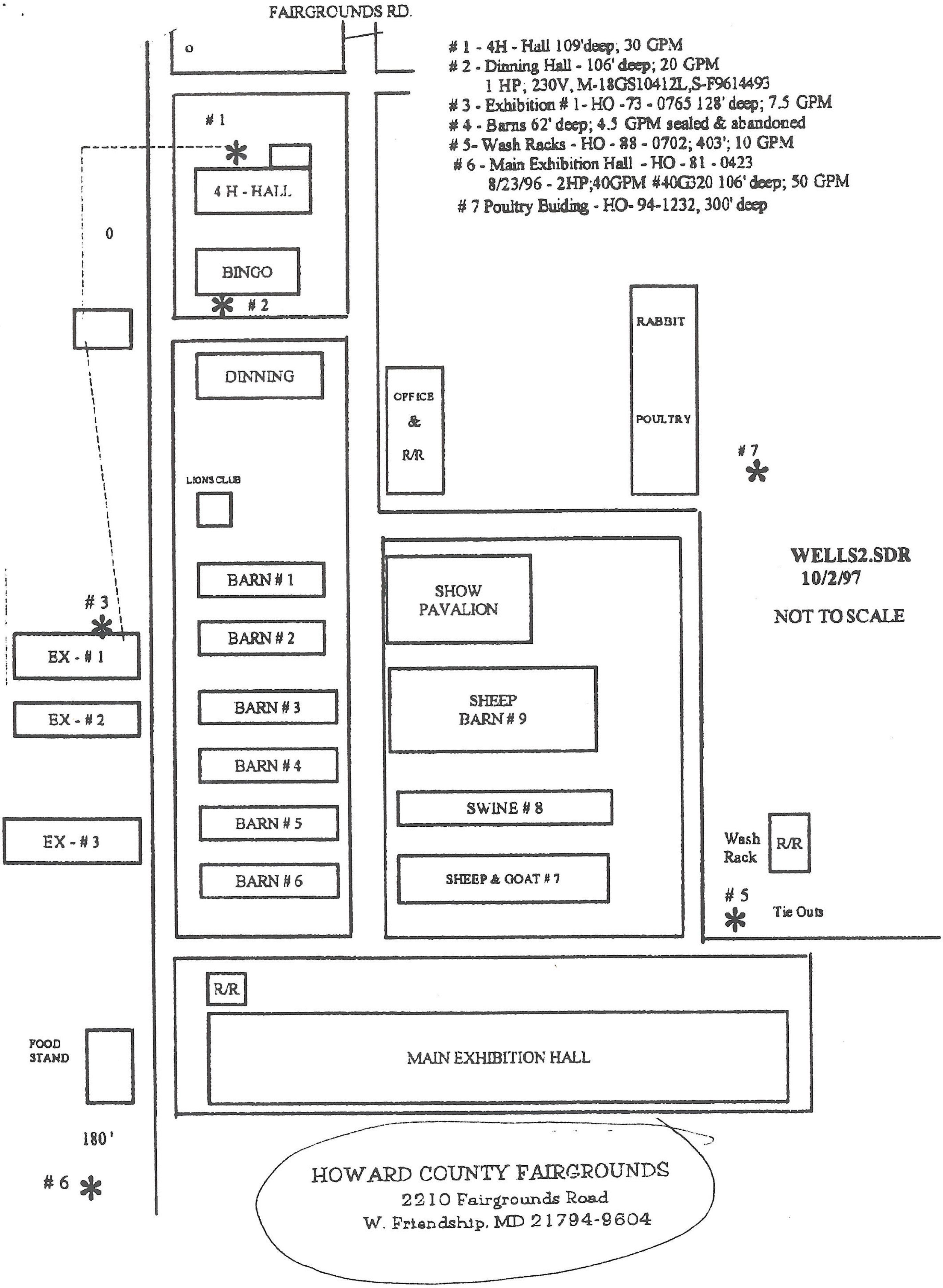
I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04. "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. [illegible]

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

COUNTY



1 - 4H - Hall 109'deep; 30 GPM
2 - Dinning Hall - 106' deep; 20 GPM
1 HP; 230V, M-18GS10412L,S-F9614493
3 - Exhibition # 1- HO -73 - 0765 128' deep; 7.5 GPM
4 - Barns 62' deep; 4.5 GPM sealed & abandoned
5- Wash Racks - HO - 88 - 0702; 403'; 10 GPM
6 - Main Exhibition Hall - HO - 81 - 0423
8/23/96 - 2HP;40GPM #40G320 106' deep; 50 GPM
7 Poultry Buiding - HO- 94-1232, 300' deep

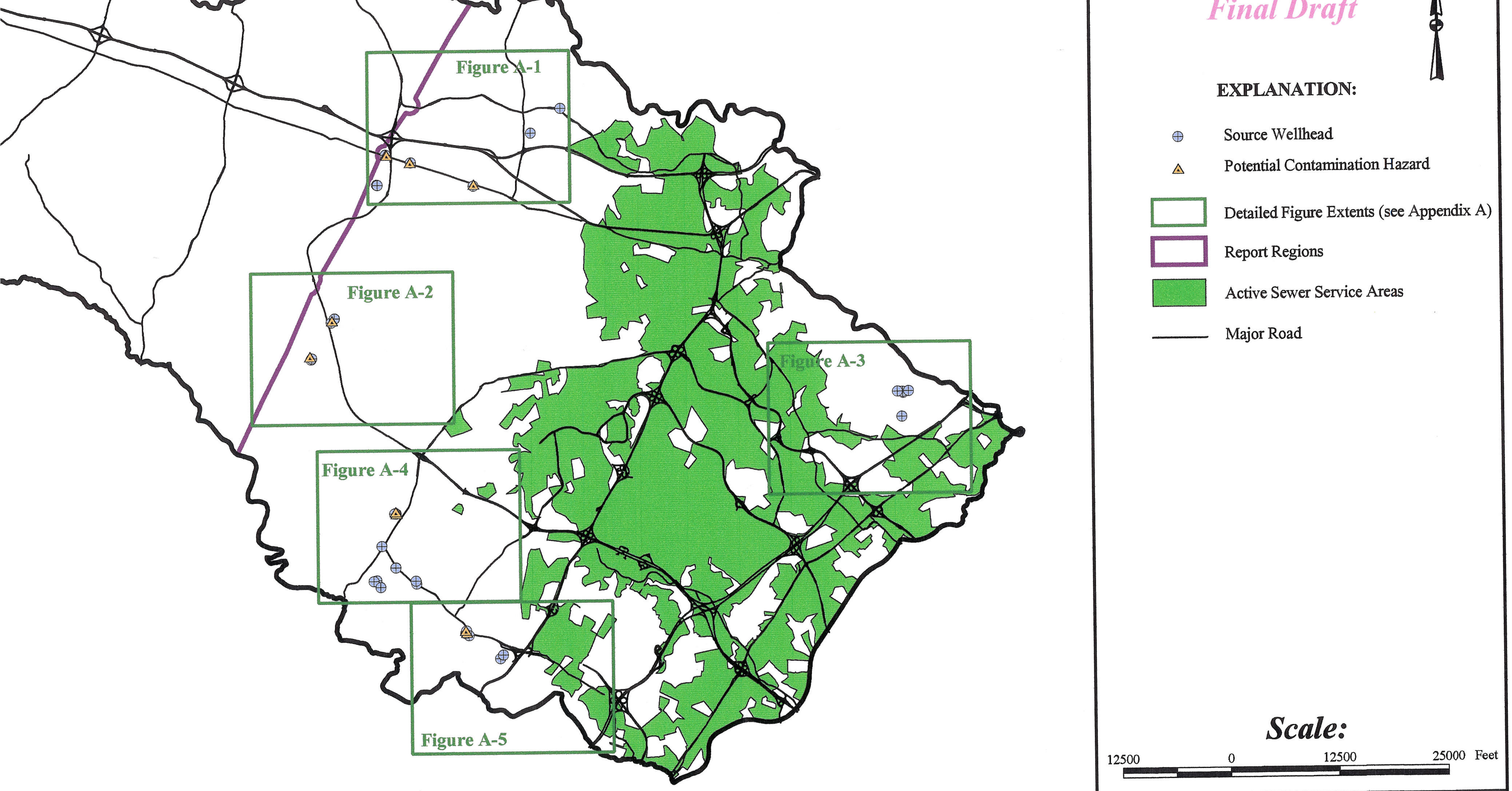
WELLS2.SDR
10/2/97

NOT TO SCALE

HOWARD COUNTY FAIRGROUNDS
2210 Fairgrounds Road
W. Friendship, MD 21794-9604

Appendix D: Data Supporting Chemical Susceptibility Determinations

Site Name	PWSID	Compound	Units	MCL	Sample Date	Sample Result
Boarman's Meat Market	1131004	Nitrate	mg/L	10	January 17, 1996	12.6
					January 8, 1997	9.9
					January 23, 1997	9.7
					December 4, 1997	11.2
					January 6, 1998	11.4
					February 10, 1999	11
					March 23, 2000	13.2
					January 16, 2001	12.6
					January 10, 2002	12
					February 11, 2003	12
Crossroads Pub	1131026	Nitrate	mg/L	10	February 3, 2000	29
					January 17, 2002	29.5
					January 24, 2002	6.8
West Friendship VFD	1131043	Nitrate	mg/L	10	January 22, 1996	8.1
					February 13, 1997	6.3
					March 18, 1999	7.7
					March 22, 2000	8.7
					March 28, 2001	8.8
					April 1, 2002	8.5
					March 4, 2003	8.8
Schooley Mill Park	1131056	Nitrate	mg/L	10	March 26, 1998	7.7
Highs-West Friendship	1131090	Nitrate	mg/L	10	November 19, 1996	6.7
					November 4, 1997	6.5
					December 16, 1998	6.2
					December 28, 1999	6.7
					December 5, 2000	7.4
					December 17, 2001	7.9
					December 10, 2002	7.8
					December 10, 2003	7.4
Belmont Conference Center Manor House	1131092	Nitrate	mg/L	10	May 12, 1998	5.2
					May 19, 1999	5.4
					June 14, 2001	5.9
					May 1, 2002	5.7
					April 15, 2003	5.1
Waverly Mansion	1131094	Nitrate	mg/L	10	January 6, 1999	8.8
					October 19, 1999	9
					November 29, 2000	8.4
					November 1, 2001	9.3
Belmont Conference Center Carriage House	1131102	Nitrate	mg/L	10	May 1, 2002	5.1



l by MDE.
eport and should only be used in that context.
d for boundary verification or

Client:

The Maryland Department of the Environment

Project:

SOURCE WATER ASSESSMENT FOR GROUNDWATER SUPPLIES SERVING TRANSIENT NON-COMMUNITY SYSTEMS

Global Environmental Solutions
ADVANCED

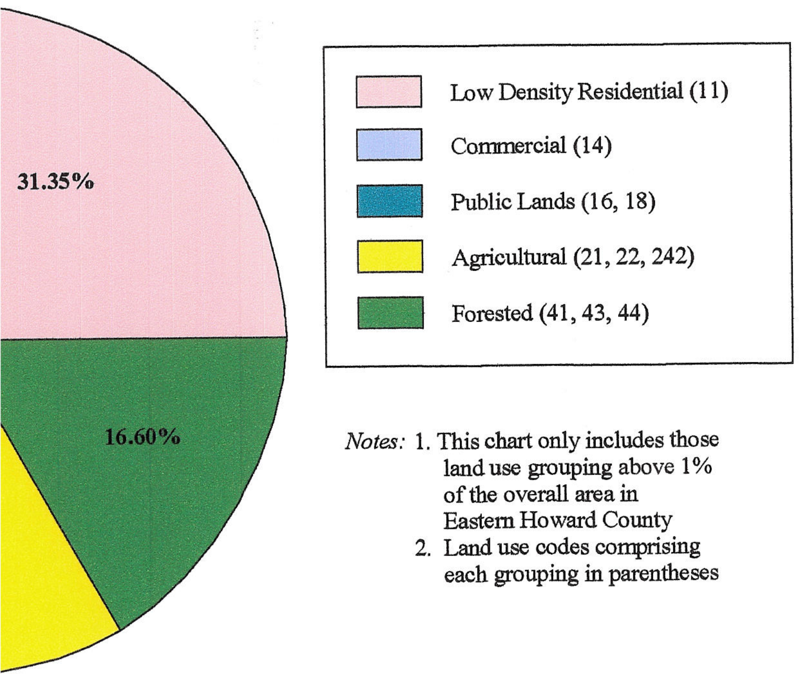
Figure 1:

Countywide Index of SWA Maps

se Code (Within SWA Areas)

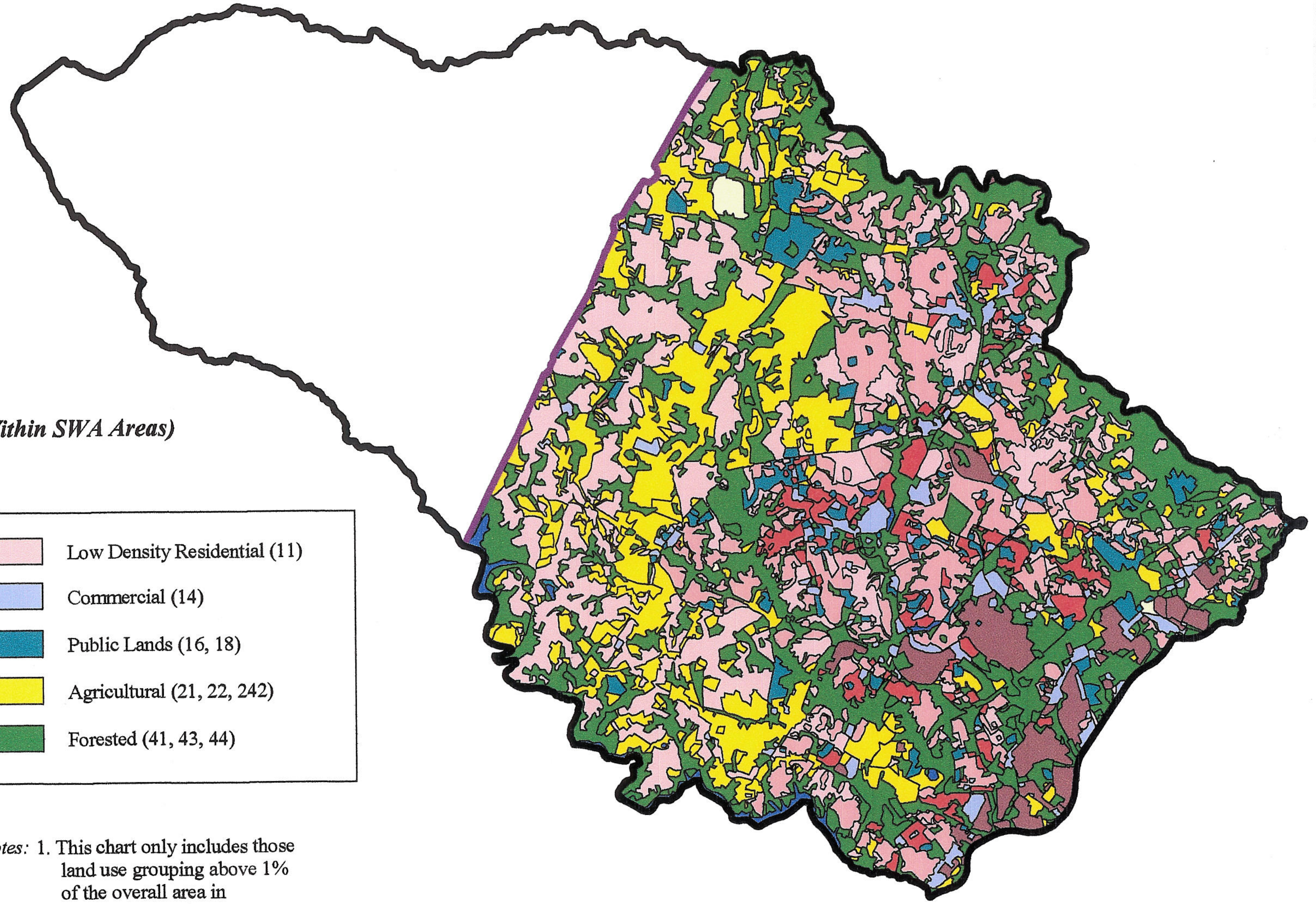
	Area (sq. meters)	Percentage of Total Area
	1,997,239	26.26
al	7,663	0.10
	370,082	4.87
	314,056	4.13
	529,082	6.96
	2,311,494	30.39
	581,644	7.65
	834,101	10.97
	143,881	1.89
	40,418	0.53
	116,991	1.54

of Overall Area by Land Use (Within SWA Areas)



Notes: 1. This chart only includes those land use grouping above 1% of the overall area in Eastern Howard County
2. Land use codes comprising each grouping in parentheses

Final Draft



EXPLANATION:

Land Uses Within Eastern Howard County:

Residential:

- Low-density Residential
- Medium-density Residential
- High-density Residential

Other:

- Water Body
- Public Lands
- Forested
- Commercial
- Agricultural
- Industrial
- Bare Ground

Scale:

17500 0 17500 35000 Feet

aryland Department of the Environment (March 2004).
port and should only be used in that context.
d for boundary verification or

Client:

The Maryland Department of the Environment

Project:

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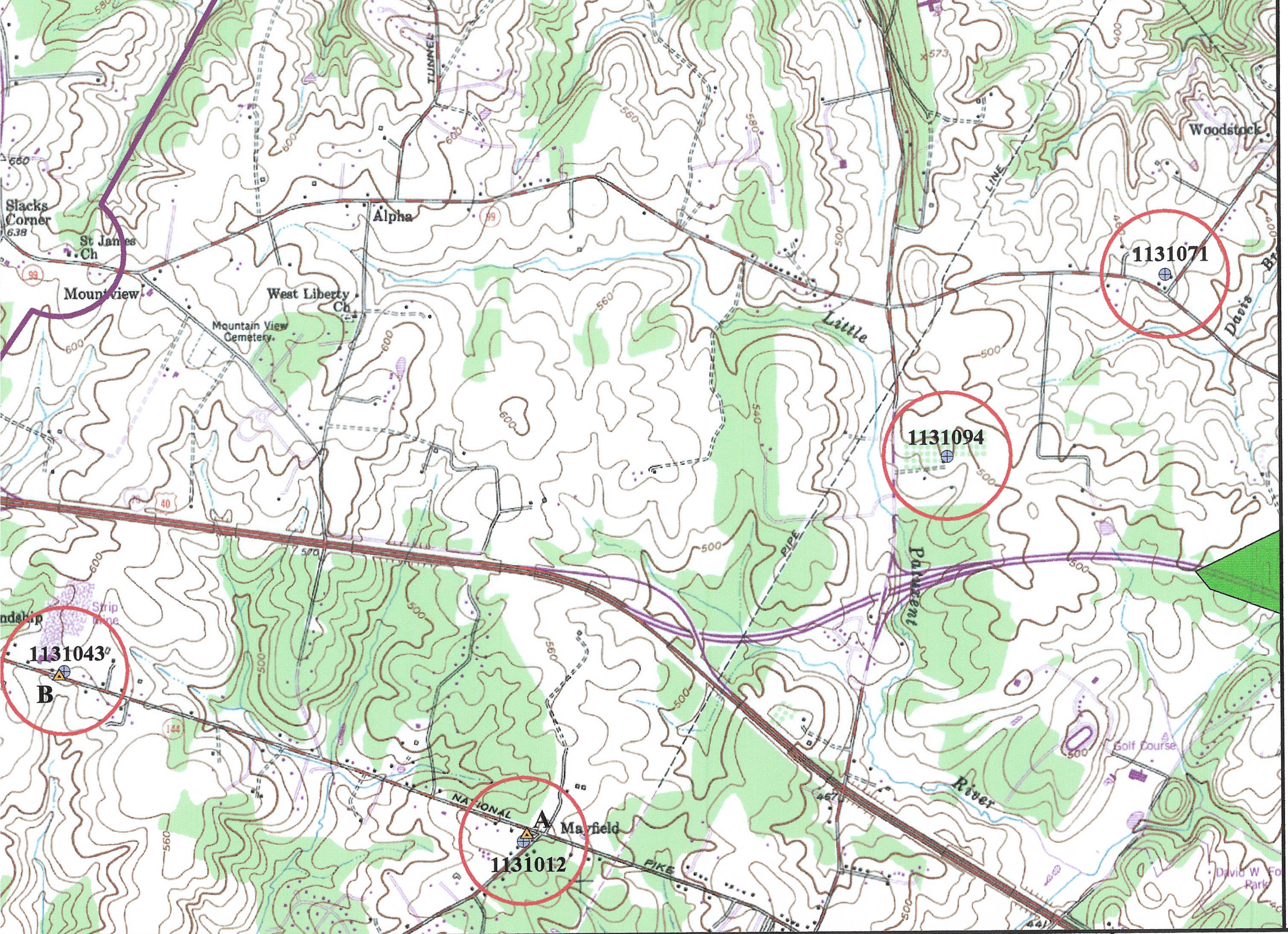
Figure 2:

Land Use Map



Final Draft

EXPLANATION:

⊕ Source Wellhead

△ Potential Contamination Hazard

○ Source Water Assessment Area (1,000 ft radius)

▭ Howard Report Area Boundary

🟩 Active Sewer Service Areas

Subject Sources:

PWSID	Source Name
1131012	Foster's Country Store
1131030(2)	Nixon's Farm
1131030(3)	Nixon's Farm
1131043	West Friendship VFD
1131071	Country Corner Snowball Inc.
1131090	Highs - West Friendship
1131094	Waverly Mansion

Scale:

2000 0 2000 4000 Feet

GS topographic quadrangle map for
); provided by MapTech, Inc.
2 of this report.
port and should only be used in that context.

Client:

The Maryland Department of the Environment

PROJECT NO. HO7S475

Project:

SOURCE WATER ASSESSMENT FOR GROUNDWATER SUPPLIES SERVING TRANSIENT NON-COMMUNITY SYSTEMS IN EASTERN HOWARD COUNTY

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Figure A-1:

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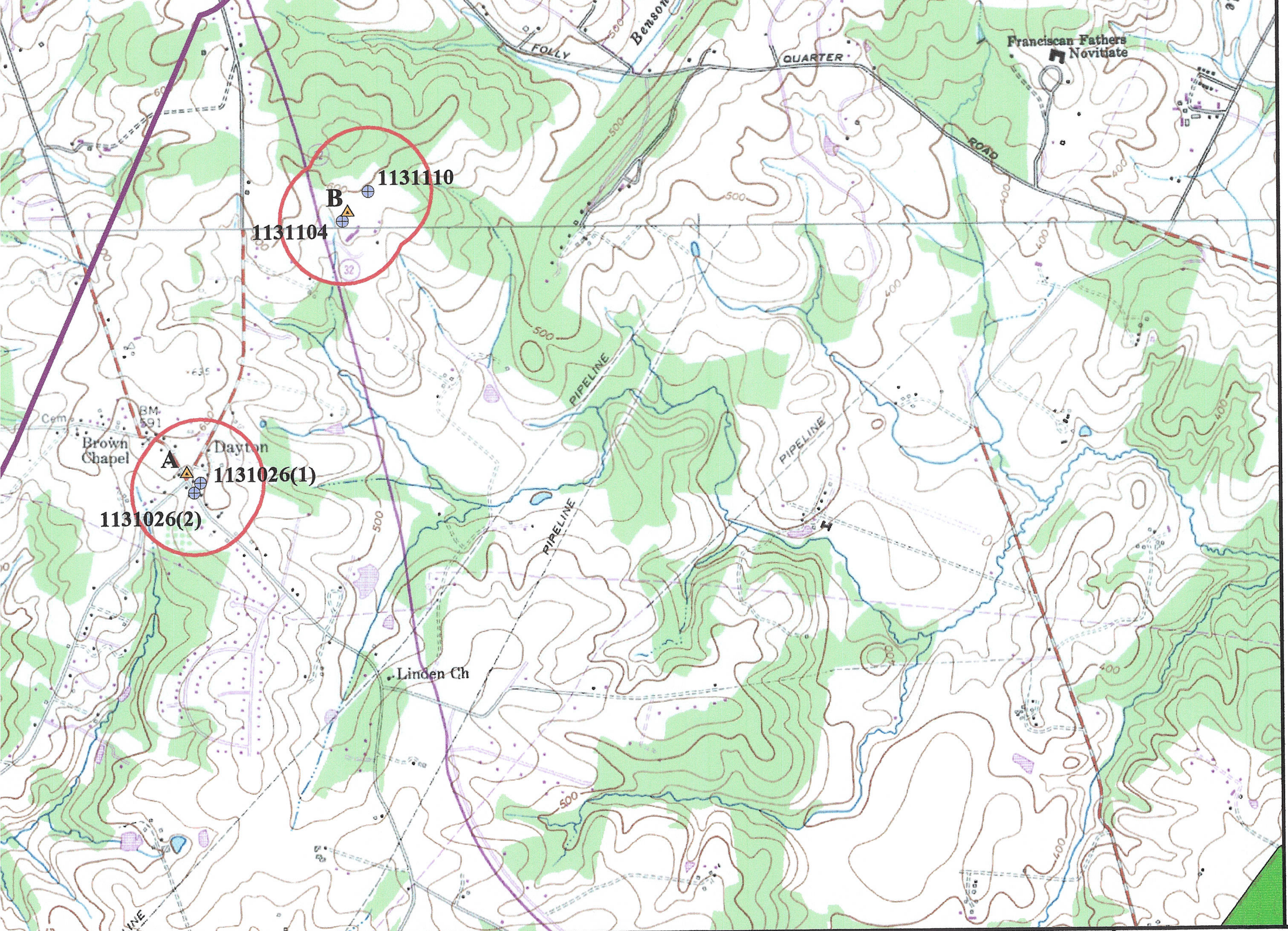

EXPLANATION:

⊕	Source Wellhead
△	Potential Contamination Hazard
○	Source Water Assessment Area (1,000 ft radius)
▭	Howard Report Area Boundary
🟩	Active Sewer Service Areas

Subject Sources:

PWSID	Source Name
1131026(1)	Crossroads Pub
1131026(2)	Crossroads Pub
1131104	Dayton Repair Facility Well #1
1131110	Dayton Repair Facility Well #2

Scale:

2000 0 2000 4000 Feet

GS topographic quadrangle maps for
g and Sykesville, MD (photorevised 1979);

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The Maryland Department of the Environment

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SOURCE WATER ASSESSMENT FOR GROUNDWATER SUPPLIES SERVING TRANSIENT NON-COMMUNITY SYSTEMS IN EASTERN HOWARD COUNTY

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Figure A-2:

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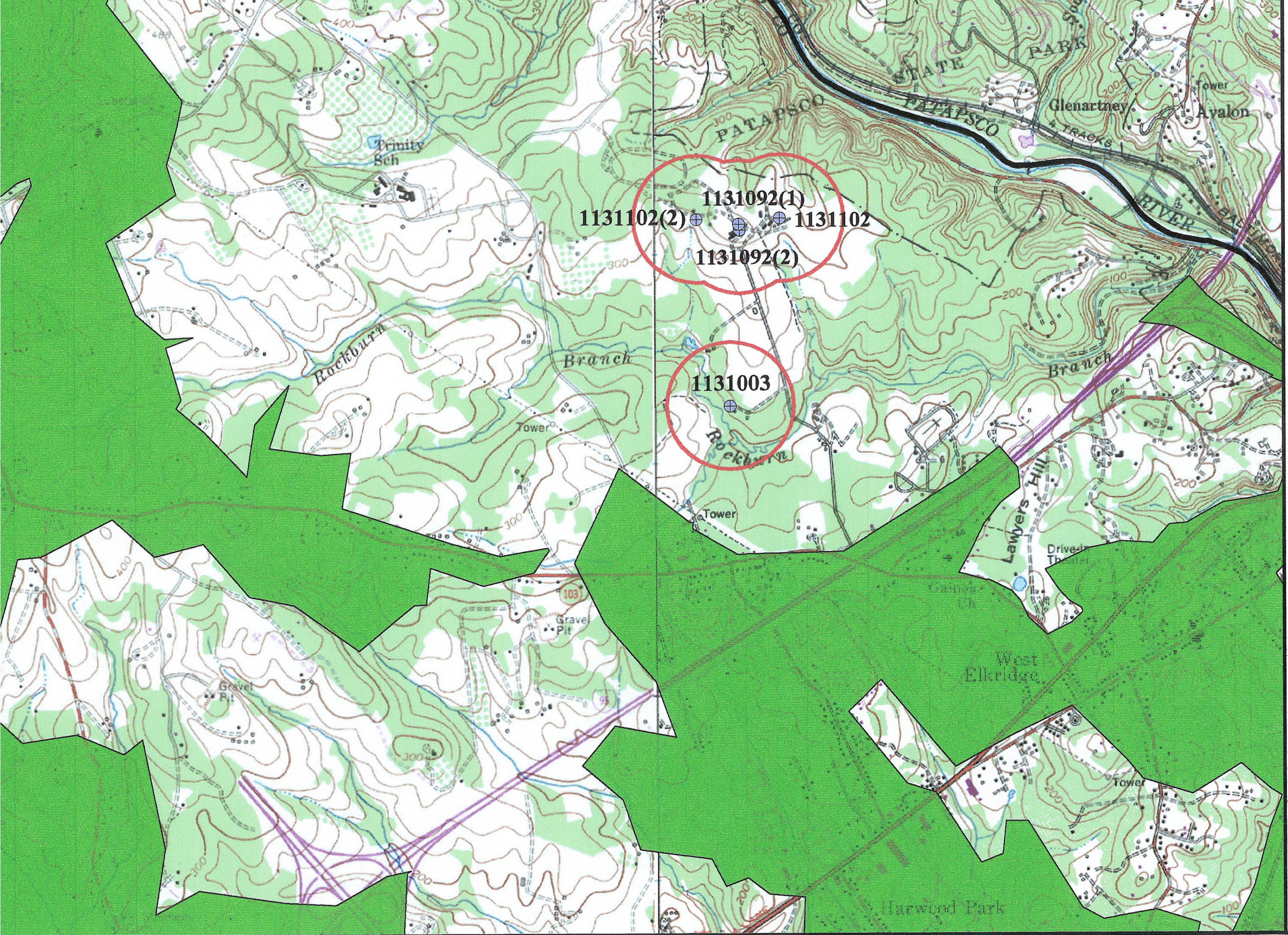

EXPLANATION:

⊕ Source Wellhead

○ Source Water Assessment Area (1,000 ft radius)

▭ Howard County Boundary

🟩 Active Sewer Service Areas

Subject Sources:

PWSID	Source Name
1131003	Belmont Conference Center Dobbin House
1131092(1)	Belmont Conference Center Manor House
1131092(2)	Belmont Conference Center Manor House
1131102	Belmont Conference Center Carriage House
1131102(2)	Belmont Conference Center Carriage House

Scale:

2000 0 2000 4000 Feet

GS topographic quadrangle maps for
d 1974); provided by MapTech, Inc.
port and should only be used in that context.
d for boundary verification or

Client:

The Maryland Department of the Environment

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Project:

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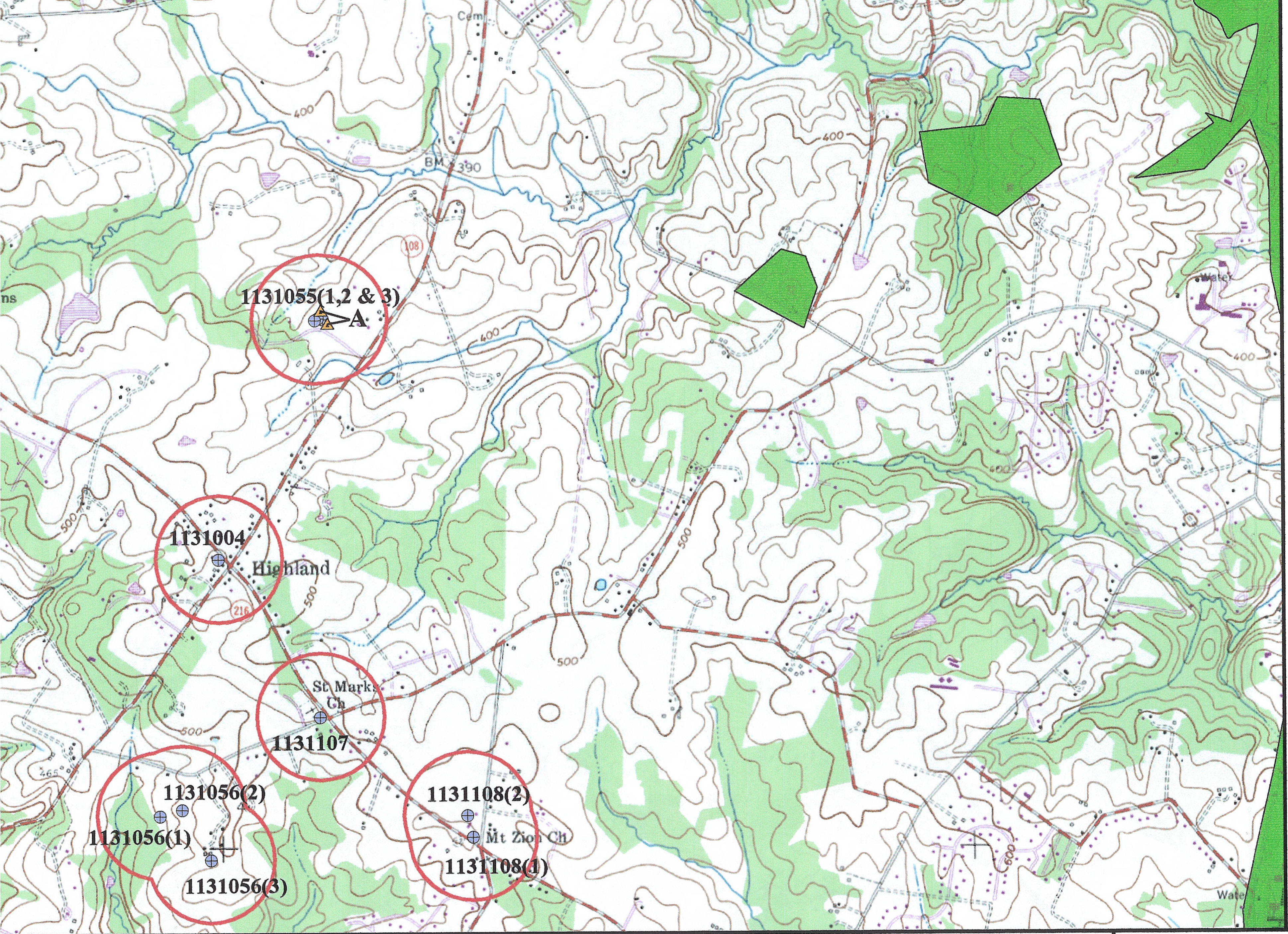
Figure A-3:



Final Draft

EXPLANATION:

⊕	Source Wellhead
▲	Potential Contamination Hazard
○	Source Water Assessment Area (1,000 ft radius)
▭	Howard County Boundary
🟩	Active Sewer Service Areas

Subject Sources:

PWSID	Source Name
1131004	Boarman's Meat Market
1131055(1)	Rehm's Catering
1131055(2)	Rehm's Catering
1131055(3)	Rehm's Catering
1131056(1)	Schooley Mill Park
1131056(2)	Schooley Mill Park
1131056(3)	Schooley Mill Park
1131107	St. Mark's Episcopal Church
1131108(1)	Mt. Zion UMC
1131108(2)	Mt. Zion UMC

Scale:

2000 0 2000 4000 Feet

USGS topographic quadrangle map for
); provided by MapTech, Inc.
2 of this report.
port and should only be used in that context.
l for boundary verification or

Client:

The Maryland Department of the Environment

PROJECT NO. HO7S475

Project:

SOURCE WATER ASSESSMENT FOR GROUNDWATER SUPPLIES SERVING TRANSIENT NON-COMMUNITY SYSTEMS IN EASTERN HOWARD COUNTY

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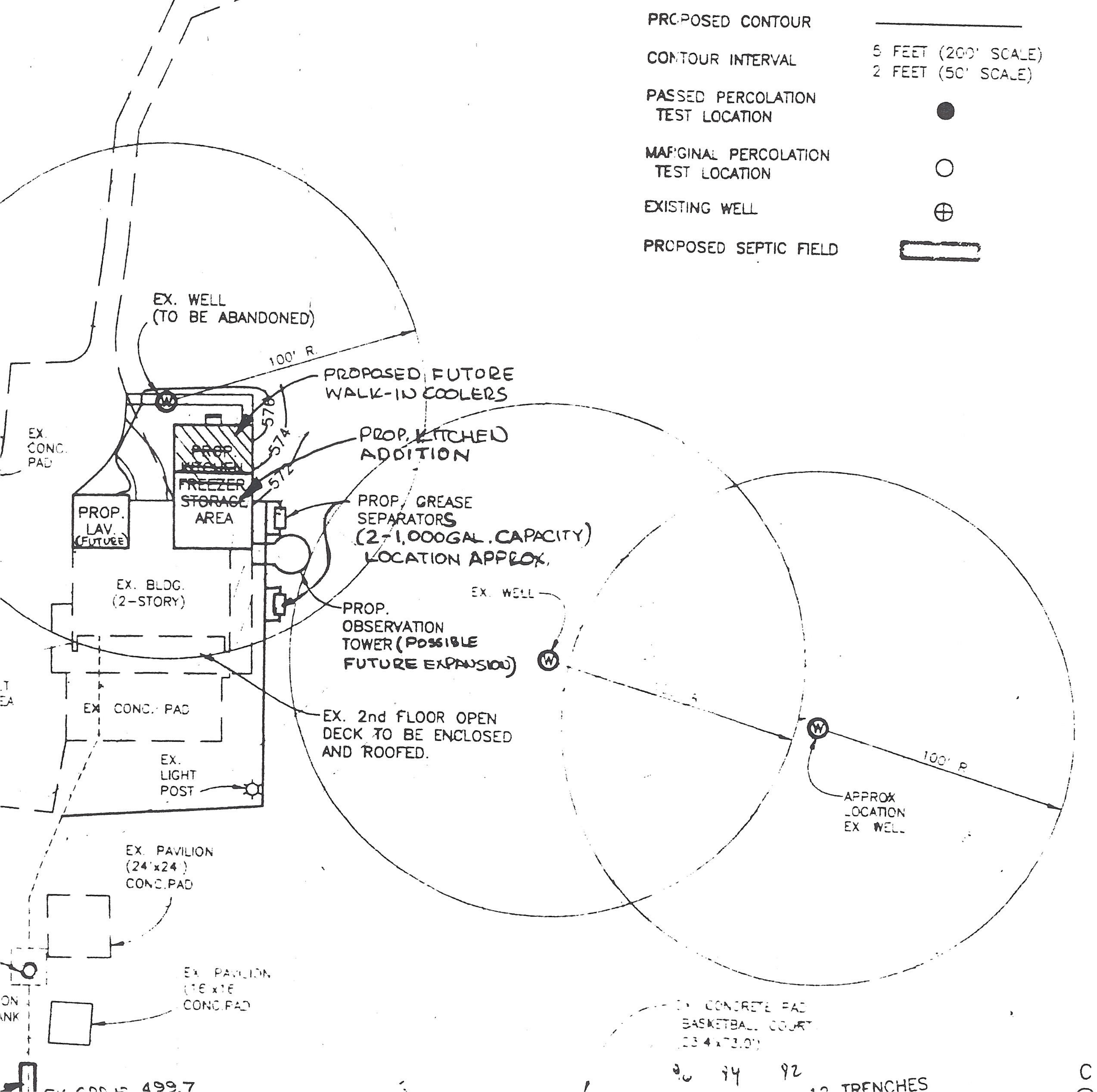
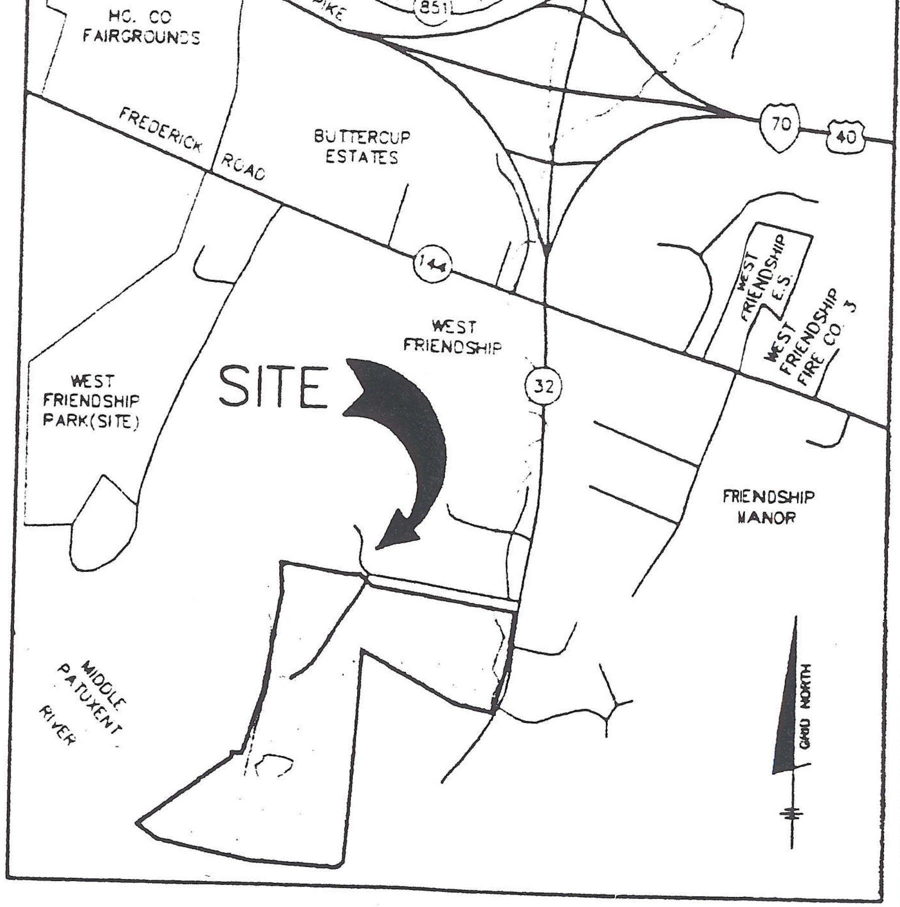
Figure A-4:

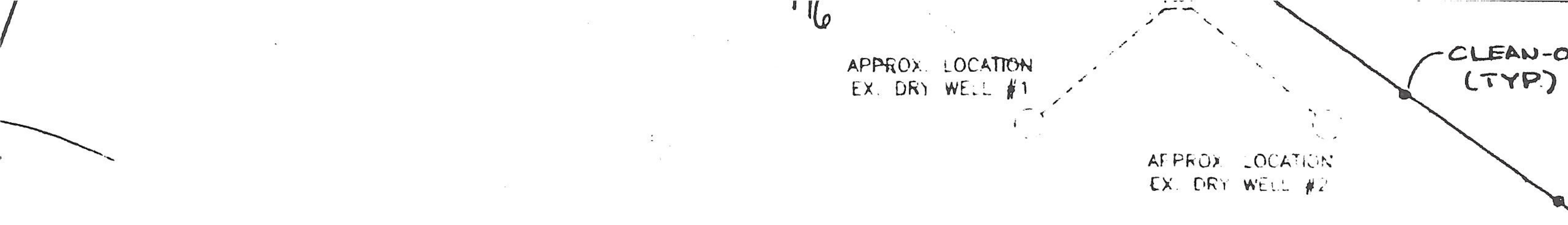




VICINITY MAP

SCALE: 1"=2000'

16



BASED ON PUMPING AND INSPECTION OF
THE EXISTING SEPTIC TANK ON 4/22/99
BY FYOCK, THE TANK IS IN SOUND CONDITION
WITH A CAPACITY OF 3000 GAL TO 3500 GAL
HEALTH DEPT. REQUIRES ADDITIONAL 1,500 GAL
TANK TO BE INSTALLED DOWNGRADE OF EXIST.
TANK.

PLAN

SCALE: 1" = 50'

SEPTIC FIELD REQUIREMENTS

1.) MAXIMUM SEATING FOR COUNTRY CLUB RESTAURANT = 195*
*- BASED ON POSSIBLE FUTURE EXPANSION
2.) BASE REQUIREMENT:
195 SEATS x 25 GAL./DAY = 4,875 GAL./DAY
A) EXISTING DRY WELL CAPACITY:
2 DRY WELLS x 750 GAL./DAY = 1,500 GAL./DAY
B) BASE REQUIREMENT TO BE PROVIDED BY PERC. FIELD:
4,875 GAL./DAY – 1,500 DRY WELL GAL./DAY = 3,375 GAL.
C) SIZE OF BASE PERC. FIELD:
3,375 GAL./DAY ÷ 3 GAL./L.F. TRENCH = 1,125 L.F. TRENC

3.) TOTAL TRENCH LENGTH PROVIDED WITHIN EACH CELL:
125 L.F. OF TRENCH x 12 TRENCHES = 1,500 L.F. TRENCH

SEPTIC SYSTEM DESIGN

(BASED ON TELEPHONE CONVERSATION
WITH CRAIG WILLIAMS ON 4/23/99. THE
EXIST. DRY WELLS WILL BE ALLOWED TO
REMAIN BUT THEIR CAPACITY CANNOT BE
CREDITED TOWARD THE DESIGN OF THE
PROPOSED SYSTEM.)

BASE REQUIREMENT (2.A ABOVE) = 4,875 G
TRENCH LENGTH REQUIRED:
4,875 GAL/DAY ÷ 3 GAL/L.F. TRENCH = 1,62
NUMBER OF TRENCHES REQUIRED (125' MAX
1,625 LF ÷ 125 = 13
SET 7 AND 6 - 125 FOOT TRENCHES ON LT

OTES

HEREON COMPLY WITH THE MINIMUM OWNERSHIP
REA AS REQUIRED BY THE MARYLAND STATE
THE ENVIRONMENT.

EA DESIGNATES A PRIVATE SEWERAGE EASEMENT
EQUIRED BY THE MARYLAND STATE DEPARTMENT OF THE
R INDIVIDUAL SEWERAGE DISPOSAL. IMPROVEMENTS
N THIS AREA ARE RESTRICTED UNTIL PUBLIC SEWER
S EASEMENT SHALL BECOME NULL AND VOID UPON
PUBLIC SEWER SYSTEM. THE COUNTY HEALTH OFFICER
AUTHORITY TO GRANT VARIANCES FOR ENCROACHMENT
SEWERAGE EASEMENT. RECORDATION OF A MODIFIED
ENT PLAT SHALL NOT BE REQUIRED.

E SHOWN NO WELLS OR SEWERAGE EASEMENTS ARE
00 FEET OF THE PROPERTY.

WN HEREON IS TAKEN FROM 200' SCALE AERIAL MAPS.
TH FIELD-RUN TOPOGRAPHY BY TSA GROUP, INC.,
UILDING AND PROPOSED SEPTIC AREA

L IS TO BE ABANDONED ACCORDING TO HEALTH
DARDS AND INSPECTIONS, PRIOR TO ISSUANCE OF
R SITE DEVELOPMENT PLAN APPROVAL. OR AT TIME
NSTRUCTION W/ APPROVAL OF HEALTH DEPT.

M DETAILS SHOWN ARE TYPICAL OR SCHEMATIC FOR THE
RMINING OVERALL CAPACITY. A FULLY DETAILED SEPTIC
O BE SUBMITTED AND REVIEWED BY THE HEALTH DEPT.
E OF BUILDING PERMIT. THE PROPOSED DISTRIBUTION
TED WITH A BULL RUN VALVE TO DIVERT FLOW BETWEEN
. #2 AT SPECIFIED TIME INTERVALS. THE TIME INTERVAL,
SE SEPARATOR, DISTRIBUTION BOX, PRE-TREATMENT
ANK (ALONG WITH ANY SIZE & CONSTRUCTION) AND
IANCES SHALL BE REVIEWED AND HAVE RECOMMENDATIONS
LTH DEPARTMENT PRIOR TO THE ISSUANCE OF THE
R SITE DEVELOPMENT PLAN APPROVAL.

APPROPIATION PERMIT TO BE AMENDED PRIOR TO
UILDING PERMIT OR SITE DEVELOPMENT PLAN APPROVAL.

NDITION OF EXISTING SEPTIC SYSTEM TO BE DETERMINED
NCE OF BUILDING PERMIT OR SITE DEVELOPMENT
.

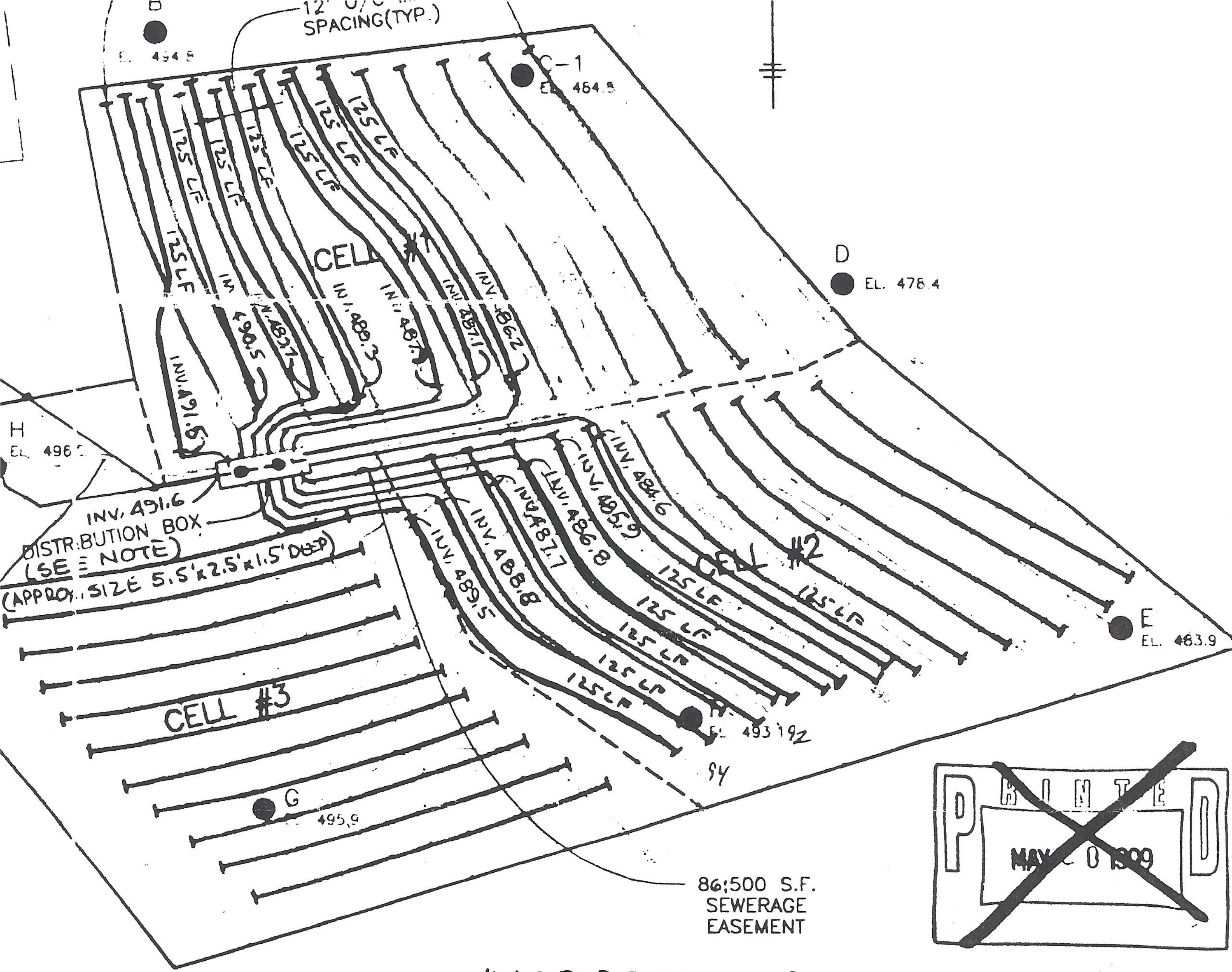
SCHEMATIC LAYOUT SHOWN IS BASED ON
MEETING WITH HEALTH DEPT. ON 8/4/99.

APPROVED:

COUNTY HE

SOILS CL

MAP SYMBOL	NAME	
Ba	BAILE SILT LOAM	
ChA	CHESTER SILT LOAM	0
ChB2	CHESTER SILT LOAM	3
ChC2	CHESTER SILT LOAM	8
ChC3	CHESTER SILT LOAM	8
CuB	COMUS SILT LOAM	LC
G1B2	GLENELG LOAM	3
G1C2	GLENELG LOAM	8
G1C3	GLENELG LOAM	8%
G1D2	GLENELG LOAM	1
GnA	GLENVILLE SILT LOAM	0%
GnB2	GLENVILLE SILT LOAM	3%
M1B2	MANOR LOAM	3%
M1C2	MANOR LOAM	8%
M1C3	MANOR LOAM	8%
M1D2	MANOR LOAM	15
M1D3	MANOR LOAM	15
M1E	MANOR LOAM	25



PRINTED
~~MAY 20 1999~~

*-AS PER PERC TEST RESULT NOTES, SET TRENCH INVERTS 4.5' BELOW EXISTING GROUND.

NO.	DATE	REVISION

SYSTEMS
TMENT

7-2-98
DATE:

RODED
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DED
ERODED
RODED
RODED
ERODED
DED
ERODED
DED

TSA GROUP, INC.
planning • architecture • engineering
8480 Baltimore National Pike • Ellicott City, Maryland 21043 • (410) 465-6105

PRINTED
AUG - 6 1999

WAYNE FILAR
20762

OWNER:

410-442-2151

MR. RANDALL NIXON
NIXON'S FARM, INC.
2800 NIXON'S FARM LANE
P.O. BOX 70
WEST FRIENDSHIP, MD 21794

PROJECT:

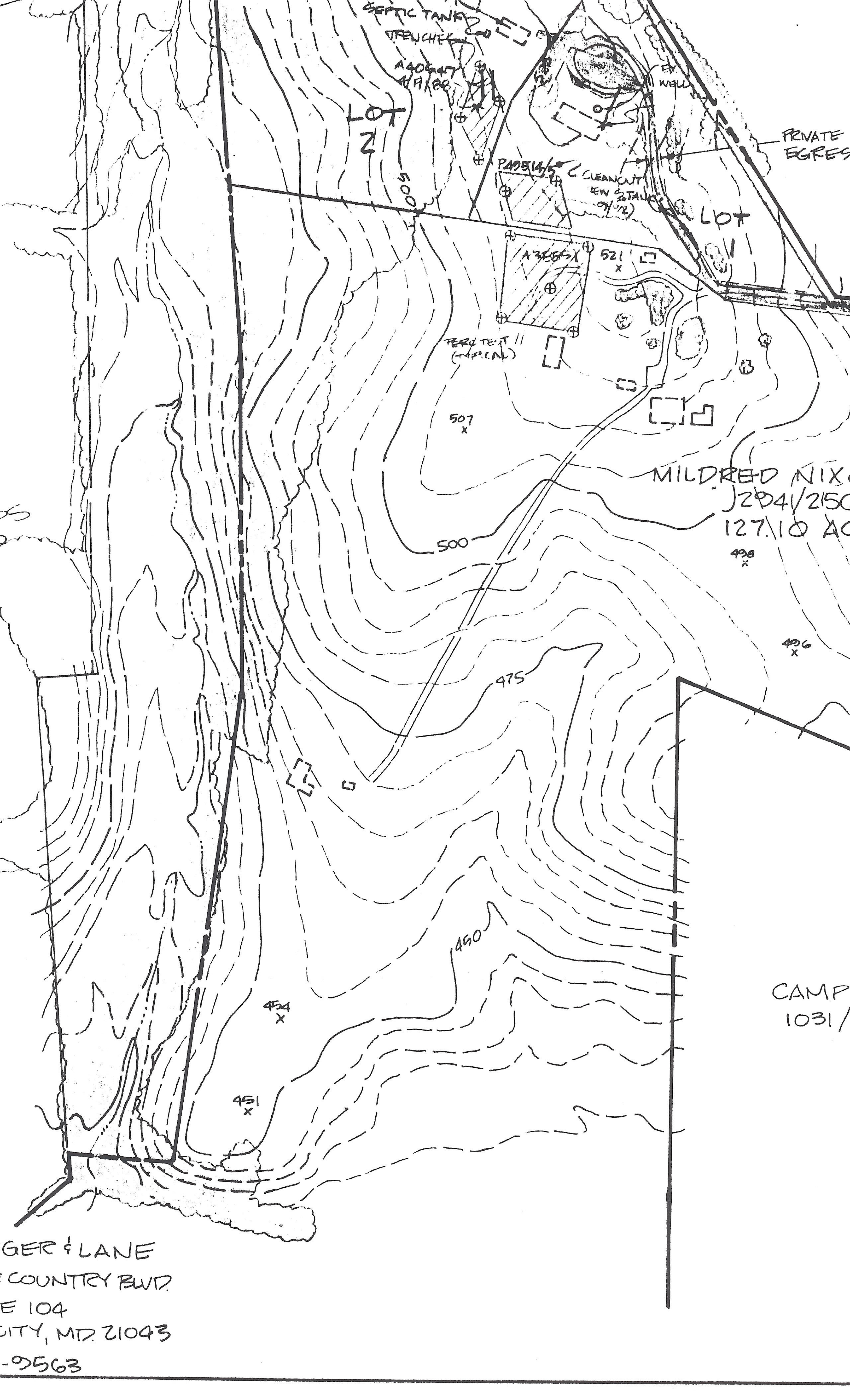
NIXON'S FARM

LOCATION:
TAX MAP 15 - GRID C
BLOCKS 16, 17, 22 & 23 - PARCEL 90
3rd ELECTION DISTRICT
HOWARD COUNTY, MARYLAND

TITLE:
PERCOLATION CERTIFICATION PLAN

DATE: SEPTEMBER 1, 1998
PROJECT NO. 1129
SCALE: AS SHOWN
DRAWING 1 OF

Design: GWF
Draft: JH/MCR


SEPTIC TANK
TRENCHES
A40647
4/11/88
LOT
2
500
EX
WELL
PRIVATE
EGRES
P495145
CLEANOUT
EW S. TANK
9/1/2
LOT
1
A38851
521
x
PERC TEST
(TYPICAL)
507
x
MILDRED NIX
2941/250
127.10 AC
500
498
x
496
x
475
450
CAMP
1031/
454
x
451
x
GER & LANE
E COUNTRY BLVD
E 104
CITY, MD 21043
-9563