

SOURCE WATER PROTECTION PROGRAM
BENEFITING THE MOUNTAIN LAKE PARK WATER SYSTEM (PWSID 011-0007)
GARRETT COUNTY, MARYLAND

ALWI PROJECT NO. MD7S075

1.0 INTRODUCTION

Advanced Land and Water, Inc. (ALWI) was engaged by the Maryland Department of the Environment (MDE) to assist 12 community groundwater systems, including the Mountain Lake Park Water System (the System), in developing and implementing Source Water Protection Programs (SWPPs). These programs will help protect public health by identifying implementable measures to address existing and potential contaminant threats to groundwater supplies of safe drinking water.

In 2004, EA Engineering, Science and Technology (EA Engineering) developed a Source Water Assessment Plan (SWAP) for the System (Appendix A). This report stated that the System historically was supplied by three production wells and ten springs. During that time, Wells 1 and 3 only were used as backup wells during times of drought, when springs exhibited low flow periods. EA Engineering also indicated that Springs 6 and 9 were unused due to microbiological contaminant issues, while Spring 4 went dry and had been unused for some time.

We updated the previous source water assessment for currency, following technical guidance and advice received from the Water Supply Program of MDE. Notwithstanding this, source water assessment is an intrinsically dynamic process. The currency of this assessment continuously is affected by new data, changing regulations and the evolving experience and professional judgment of those involved in developing and implementing this assessment and the recommendations herein.

1.1 PURPOSE

Maryland's Source Water Assessment Program was approved by the U.S. Environmental Protection Agency (EPA) in November 1999, and the initial Source Water Assessment for the System was completed in 2004. The 2004 assessment included recommendations for ongoing management and protection, as well as periodic updates to reflect changes to the water system, appropriation permit and/or land uses within Source Water Protection Areas (SWPAs) as they may periodically occur.

While these past efforts recommended certain source protection and management concepts, MDE determined that the System be included in our current work based on a combination of the size of the population served and the vulnerability of the aquifer to potential groundwater contaminants. Accordingly, the overall purpose of this work is to assist the System in developing a SWPP, which includes specific guidance on implementing feasible source protection measures.

1.2 REGULATORY FRAMEWORK

ALWI followed MDE's source water assessment and wellhead protection guidelines, which stem from The Safe Drinking Water Act (SDWA) of 1974 and its later amendments. The SDWA established wellhead protection programs for each state under the oversight of the EPA. The 1996 Amendments to the SDWA mandated that the State of Maryland develop a Source Water Assessment Program. MDE contracted EA Engineering to complete such a Source Water Assessment in 2004 (Appendix A).

In September of 2011, ALWI was awarded the SWPP contract. The System's participation in the SWPP was voluntary and not a regulatory requirement under the SDWA.

1.3 BACKGROUND INFORMATION

The System (PWSID 001-0007) serves approximately 3,000 people with 1,200 connections. The system actively withdraws water from two wells (Wells 2 and 6a) and one spring (MLP Spring 1). Wells 1 and 5 are backup wells used only in instances of emergency. Wells 1, 2, 5 and 6 are new sources and as such were not included in the 2004 assessment. System representatives indicated that MLP Spring 2 will be used in the near future. The four active wells and one active spring have a combined water appropriation permit (Permit No. GA1979G007/05) for 250,000 gallons per day (gpd) on a yearly basis and a daily average of 300,000 gpd during the month of maximum use. These sources draw water from the Pocono Group.

Additionally, system representatives anecdotally stated that backup Well 1 has known arsenic contamination equivalent to the MCL, which may be of natural origin from surrounding rock formations. Springs 3, 5, 6, 7, 9, 10 and 11 are unused and disconnected, and old wells 1, 2 and 3 have been abandoned.

In 2004, EA Engineering presented a comprehensive analysis of the risks to source waters supplying the Mountain Lake Park System, along with information necessary to implement protection programs. EA Engineering's recommendations for the System included the following:

- Form a team to protect the water supply;
- Provide the public with information for safeguarding the SWPA;
- Continue to monitor groundwater for SDWA contaminants (as required by MDE);
- Form a contingency plan in emergency situations;
- Update potential contaminant source inventories;
- Purchase conservation easements or property;

- ❑ Implement a filtration system prior to disinfection for the groundwater from the supply springs; and
- ❑ Rehabilitate springs to mitigate the risk of surface water runoff.

One of ALWI's overall SWPP goals is to assist the Mountain Lake Park System in moving forward with implementing many of these recommendations.

1.4 GARRETT COUNTY SENSITIVE AREAS ORDINANCE

The Garrett County Sensitive Areas Ordinance (the Ordinance; Appendix B) was originally adopted on June 24, 1997, and amended May 25, 2010. The Ordinance includes a map of its applicable areas outlined in red, including the Mountain Lake Park SWPA that is subject to this effort.

The Ordinance provides for and applies a two-zone approach to incremental groundwater source protection. It provides for "Zone 1" delineations via 500-foot fixed radii around sources based on a criterion established by, and for use in, Garrett County. Zone 2 areas generally are the surrounding, contributing watersheds, and these delineations generally follow applicable MDE source water delineation guidance. At the outset of this work, the map that is integral to the Ordinance included then-current delineations. However, this map requires updating because of a new System source (Well 2), a future source (Spring 2) and increased water appropriation permit quantities. Chapter 2.0 of this report presents revisions to the existing delineations.

The Ordinance establishes requirements and prohibitions to protect community well sources from potential groundwater contamination. Largely, its groundwater protections are accomplished through restrictions on incompatible land uses within SWPAs. Specifically, the Ordinance offers the following protections:

- ❑ Both above ground and underground storage tanks are prohibited from being placed within 500 feet (Zone 1) of a community water supply system well.
- ❑ Hazardous substance storage tanks located within the SWPA, but more than 500 feet from a community water supply system well, shall be placed above ground and be surrounded by a 100% catchment basin or double-walled containment and a spill protection overflow alarm.
- ❑ Uses which involve, as a principal use, the manufacture, storage, use, transport, or disposal of hazardous materials; or any use which involves hazardous materials in quantities greater than associated with normal household use are prohibited.

A more complete list of use restrictions around wells is included in Appendix B. ALWI notes that presently the language of the Ordinance does not include springs, but only wells.

2.0 UPDATE TO 2004 SWPA DELINEATIONS

ALWI reviewed the 2004 SWPA delineations for conformity to spring and well locations, present site conditions, System operational practices, Ordinance provisions, and current MDE guidance. We updated the previous source water protection area delineations (as required by MDE) to address the installation of Wells 1, 2 5 and 6 and future Spring 2, and the appropriation permit increase for the System. Such changes alter the cones-of-depression created by wells in the aquifer, potentially altering local flow paths and the area from which these sources draw water.

The new delineations are concordant with the Garrett County Sensitive Areas Ordinance, as amended on May 25, 2010 (Attachment A), which embraces a two-zone approach to protection as follows:

- ❑ **Zone 1** - Zone 1 needed revision to reflect the new source locations. We also found that the delineations, as shown on the Ordinance Map, did not echo the delineation methodology of the Ordinance (500-foot fixed radii around individual sources). These matters, along with the idea of protecting springs in the same manner as wells, were discussed with both the System and MDE, along with the idea of protecting springs in the same manner as wells. Both the System and MDE were in agreement that our revisions to the Zone 1 areas appropriately comport with the Ordinance delineation methodologies. Accordingly, we generated such 500-foot fixed radii circles around each active well and spring source (Figure 1) to comport with the intent of the Ordinance (Appendix B). We also assumed that the County would accept our recommendation that they broaden their source definition language to reference springs (in addition to wells).
- ❑ **Zone 2** - The Zone 2 delineations also are concordant with applicable MDE guidance. For Mountain Lake Park, they reflect the approved Zone 2 delineations furnished to and approved by MDE on March 2. We adjusted the existing SWPA to reflect an annual average permit appropriation increase of 20,000 (Permit No. GA1979G007/05). This increase reflects the change from 230,000 gpd, as reflected in the delineations made in the 2004 source water assessment, to 250,000 gpd. By applying the same drought level recharge rate as in the 2004 report (400 gpd/acre) we calculated that the SWPA needed to increase by 50 acres. We appended these additional 50 acres to the westernmost portion of the previous delineation to better protect Well 2, the System's newest supply well not already enveloped by the 2004 delineation.

The Steering Committee (see Chapter 6) sought conformity with this Ordinance and its two-zone approach to source water protection. The Steering Committee was reluctant to embrace any changes to delineation methods that we otherwise might have contemplated because of their ripple effect upon the existing ordinance.

3.0 CONTAMINANT THREATS ASSESSMENT

ALWI performed a regulatory database review, field reconnaissance and limited interviews to update the 2004 inventory of potential sources of contamination within the SWPAs. Both point

and non-point sources of contamination were considered. Additionally, MDE specifically suggested that the compatibility of existing and future natural resources development projects within the SWPAs be considered. Such natural resources projects may include but are not necessarily restricted to coal mines, natural gas wells and timbering operations.

3.1 STATE ENVIRONMENTAL DATABASE REVIEW

MDE provided ALWI the following state-maintained environmental databases to incorporate into point-source hazard inventories, with the date of database publication provided parenthetically as follows:

- ❑ Municipal and Industrial Groundwater Discharge Permits (6/14/2012);
- ❑ Pesticide Dealers (1/12/2012);
- ❑ Land Restoration Program Sites (Voluntary Cleanup Program and Comprehensive Environmental Response, Compensation, and Liability Act) (1/16/2012);
- ❑ MDE Oil Control Program databases (10/14/2011);
- ❑ Supplemental database listing of solid waste facilities, wood waste disposal sites and other hazardous waste generators. (2/2012); and
- ❑ Resource Conservation and Recovery Act sites (6/18/2012).

The databases helped with interpretations of groundwater susceptibility, in that the listed facilities may be generators of hazardous materials, petroleum products and/or other drinking water contaminants. Results of this review are integrated with the points source hazard inventory (Section 3.3) of this report.

3.2 FIELD RECONNAISSANCE WITHIN SWPAs

On December 13, 2011, ALWI performed a field reconnaissance guided by system representatives. During this reconnaissance, local land use conditions were observed with emphasis on the potential use, storage and disposal practices of hazardous materials and petroleum products in the delineated SWPAs.

Such conditions may have included visual evidence of present or former spills, stained or discolored ground surfaces, stressed vegetation, unusual odors or visible underground storage tank facilities. Adjacent and nearby properties were visually scanned to the degree practicable from public rights-of-way.

Though ALWI did not observe specific contamination threats warranting further investigation or corrective action, (1) contaminant hazards may exist and could remain undetected due to limitations in the methods employed (concealed visual evidence, etc.) and/or (2) new contamination hazards may develop in the future. For these reasons, the measures employed

herein for identifying contaminant hazards should be repeated periodically for the assessment to remain current.

No point-source hazards, significant land use or waste disposal changes were noted. ALWI notes that the SWPAs are extensively forested and inaccessible by vehicle. However, some residential and forested areas were not accessible without substantial trespassing on private property. The possibility of concealed point-source contamination hazards remains, consequently.

The municipal production sources appeared to possess good physical integrity, though no subsurface or invasive work of a confirmatory nature was performed. Additionally, no visible changes in well physical integrity were noted.

3.3 POTENTIAL POINT SOURCE CONTAMINATION HAZARDS

During our December 13, 2011 field reconnaissance, ALWI staff did not directly observe any potential point sources of contamination specifically within the SWPAs. Point source hazard databases provided by MDE (Section 3.1) did not indicate the presence of sources of potential contamination within the SWPAs for the System.

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

In order to evaluate the hazard represented by non-point sources of contamination, MDE guidance suggests consideration and mapping of the public sewer service area and land use data within the SWPAs (Figure 1). Pertinent land use acreages and percentages by SWPA are listed in Table 1. Each of these has implications in terms of non-point contaminant sources (e.g., septic systems). Note that public sewer service areas do not exist within the SWPAs.

Potential sources of non-point-source contamination may include but are not restricted to:

- ❑ **Septic System Discharges** - These include nitrate- and bacteria-laden discharges concordant with the intended design of septic systems. They also can include the inappropriate discharge of hazardous and other regulated liquids through such systems, arising from ignorance or intent. For this reason, MDE guidance suggests consideration and mapping of the public sewer service area(s), with the inference that those areas not sewered are on septic systems. Sewer system maps available from the Maryland Department of Planning (MDP) suggest that 100% of the SWPA lies outside of the sewered area. Though sparse in geographic expanse, septic systems are still used today and their potential failure could act as a source of contamination for viruses, bacteria, disinfection byproduct (DBP) precursors and nutrients, such as nitrate.
- ❑ **Agriculture** - Fertilization of cultivated fields, livestock wastes, and agri-chemical releases constitute the primary sources of groundwater contamination from agricultural sources. Agricultural lands within the SWPAs may be sources of nutrients (including nitrates), DBP precursors, herbicides, insecticides and/or animal wastes. Land use coverage maps (Figure 1) indicate that 23% of the total SWPA is in agricultural use and that farming land uses do not exist closer than approximately 150 feet from any of the wells (Well 2 is closest), and

approximately 750 feet of any of the springs (future Spring 2 is closest).

- ❑ **Energy and Other Natural Resources Operations** - Natural resources extraction and utilization activities possibly could imperil groundwater quality based on similar occurrences reported elsewhere in the country. Major timbering operations, coal mines, and natural gas exploration and production operations may warrant greater scrutiny and/or protective measures before they come to exist or expand within the SWPAs. Land use coverage maps may not reflect the full extent of such existing and planned land uses, but suggest that no part of the SWPA is classified as “mined land.” ALWI identified via maps obtained from the Garrett County website (Appendix C) that no lands within the SWPAs have been leased to natural gas entities. The same maps indicated that mineral rights within the SWPAs have not been sold.
- ❑ **Sediment and Stormwater** - Commercial and industrial land uses, particularly those with substantial impervious areas, may contribute to contaminant- and sediment-laden stormwater within the SWPA. Available mapping data suggests that no land in the SWPA is designated for commercial or industrial use, though some measure of future development (particularly in pursuit of natural resources) remains possible.
- ❑ **Heating Fuel Use and Storage** - Though not restricted by the existing Ordinance (see Section 6.3, No. 2), liquid petroleum products commonly are used as a heating fuel. Leaks and spills associated with the use and storage of heating fuels may expose System sources to hydrocarbon contamination. According to the Ordinance, hazardous substance storage tanks within 500 feet (i.e., Zone 1) are prohibited. Further, hazardous substance storage tanks within SWPAs outside of 500 feet (i.e., Zone 2) must be above ground and surrounded by a 100% catchment basin, or double-walled containment, and a spill protection overfill alarm. Though the extent of reliance on heating fuels within each SWPA is unknown, determining the degree to which heating oil is used was outside of the scope of this SWPP.

Sources of the information summarized in this subsection included 2010 land use and recent public sewer service areas Geographic Information System data obtained from the MDP (Figure 1). Table 1 reflects dominant land uses by type, within each delineated zone within the SWPA. Figures 2 and 3 reflect this information in pie chart form.

4.0 CONTAMINANT SUSCEPTIBILITY

ALWI completed a review of available groundwater quality records, integrated with other findings herein, to support an assessment of groundwater susceptibility. MDE guidance defines a threshold regarding a water source being “susceptible” to a given contaminant as being either:

- ❑ When the concentrations equal or exceed 50% of the MCL for 10% or more of the documented samples for a regulated contaminant and/or
- ❑ When a persistent but lower concentration is either increasing or chemically appears associated with an unknown or unexpected source.

In addition to these water quality data considerations, ALWI also considered the following factors in evaluating overall susceptibility:

1. The spatial position of potential contamination hazards relative to System water sources and SWPAs (note that no such hazards were identified within the SWPA for the System),
2. Observed conditions of wellhead integrity and treatment supplies management, and
3. The natural chemical properties of the source water within contributing aquifers.

4.1 PROCEDURES

ALWI completed the susceptibility assessment in accordance with the following step-wise procedure:

1. **Obtain and Filter Water Quality Databases** - ALWI reviewed available electronic databases of water quality analyses provided by MDE for the period 2004 to 2011. The raw databases were filtered to isolate only groundwater contaminants affecting Town groundwater supplies.
2. **Consider Chemical Classes and Sampling Conditions** - The furnished databases were developed by MDE as an incidence of operational compliance record-keeping. They contained analytical records for inorganic compounds (IOCs) including radiological species, volatile organic compounds (VOC) and synthetic organic compounds (SOC). In most cases, the available water quality records only reflect post-treatment, composite water samples and not raw groundwater sources. As such, mixing, blending and treatment efficacy is reflected in the water quality results as furnished to us. Generally the absence of comprehensive analytical results of raw groundwater samples hampered correlating specific water quality findings to specific wells, aquifers and contributing SWPAs.
3. **Review of MDE Paper Files** - To gain a more thorough understanding of raw water quality by source, ALWI supplemented the MDE databases with raw groundwater quality laboratory results available in MDE paper files. Specifically, we obtained well specific IOC, VOC and SOC data for Test Wells 1, 2, 5 and 6. One sample was taken from each well between 2007 and 2008.
4. **Identify “Exceedance” Instances** - In order to identify water quality sample exceedances, we compared each specific analytical result to published MCLs (in COMAR 26.04.01 as of September 2011). Guided by MDE, we judged that a concentration greater than or equal to 50% of a given MCL should be considered an “exceedance.” Procedurally, this was accomplished by sorting the database by analyte and concentration.
5. **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. Contaminants with results equaling or exceeding 50% of the MCL

more than 10% of the time were considered *prima facie* susceptible. ALWI also identified changes in contaminant trends over time, even for those that did not equal or exceed 50% of the MCL more than 10% of the time.

6. **Integrate Information** - ALWI then considered these identified exceedances in the context of the results of the contamination hazard reconnaissance to correlate water quality results to specific field observations suggestive of a condition of susceptibility.

4.2 WATER PHYSICAL PROPERTIES

No water quality samples reflecting physical properties (i.e., turbidity, total dissolved solids, etc.) that were reported in post-treatment composite or raw groundwater samples exceeded 50% of their respective MCLs. Raw water sampling from Well 5 on December 7, 2007 had total dissolved solid (TDS) and turbidity values of 138 milligrams per liter (mg/L) and 0.24 NTU, which were below their respective MCLs of 500 mg/L and 5 NTU. Same day sampling for Well 6 had TDS and turbidity values of 53 mg/L and 0.22 NTU, respectively. Well 1 had a turbidity value below 1 NTU and a TDS of 101 mg/L. Well 2 had a turbidity value below 1 NTU; no other TDS measurement was taken for this well.

4.3 INORGANIC COMPOUNDS

Water samples collected between 2003 and 2011 did not contain IOCs in excess of 50% of their respective primary MCLs. As a whole, the System is not susceptible to contamination from inorganic compounds. However, a raw water sample from Well 5 had a manganese concentration of 0.09 mg/L, almost twice the secondary MCL of 0.05 mg/L. Manganese was detected in low concentrations in Wells 1 and 2, and was not detected in Well 6. Naturally occurring manganese within the underlying bedrock is the most likely source of these detections.

Low levels of nitrate (MCL of 10 mg/L) were detected over this period, never exceeding a concentration of 2.7 mg/L. Adjacent agricultural lands are a potential source of nitrate contamination, though an indeterminable amount is likely contributed naturally from forested lands due to erosion, natural leaching and waste from forest animals, such as deer.

Samples collected in the distribution system exhibited low concentrations of arsenic (2005 & 2011), barium (2005-2011), selenium (2008) and thallium (2005), all below their respective MCLs.

A raw water sample from Well 5 had an arsenic concentration of 0.0037 mg/L in 2007. Arsenic (MCL of 0.010 mg/L) was not detected in Well 6 or 2 though sampling was performed on a different date. Despite the anecdotal recollection of elevated arsenic in Well 1 by a system representative, no Well 1 arsenic data were provided to ALWI for our assessment.

4.4 VOLATILE ORGANIC COMPOUNDS

No VOCs were detected in the post-treatment composite or raw water quality samples collected between 2004 and 2011. The System is not susceptible to VOC contamination.

4.5 SYNTHETIC ORGANIC COMPOUNDS

No SOC's were detected in the post-treatment composite or raw water quality samples collected between 2004 and 2011. The System is not susceptible to SOC contamination. However, the potential exists for non-point sources, including agricultural land, to introduce pesticide and/or herbicide contamination into the aquifer from which the System withdraws its water.

4.6 DISINFECTION BY-PRODUCTS

DBPs, including trihalomethanes and haloacetic acids, form in the distribution system as a complication of mixing organic matter (found naturally in water) and chlorine (used for disinfection processes). The sum of these trihalomethanes is measured as Total Trihalomethane (TTHM), whereas the sum of these acids is measured as Total Haloacetic Acids (THAA). Both TTHM and THAA exceeded 50% their respective MCLs (80 micrograms per liter and 60 micrograms per liter) in one sample out of 29 total samples, with TTHM exceeding the MCL in that one sample. All other samples were well below 50% of the MCL. The system distribution system is not susceptible to DBPs.

4.7 OTHER CONTAMINANTS

Though ALWI did not find the System sources susceptible to the following contaminants, the 2004 SWAP report indicated past conditions of interpreted susceptibility for these contaminant groups:

- ❑ **Groundwater Under the Direct Influence of Surface Water (GWUDI)** - MDE reported that the springs historically tested positive for GWUDI. Since that determination, Springs 1 and 2 have been rehabilitated and subsequent samples resulted in a finding that these sources no longer are GWUDI. All other springs that were on the system have been disconnected.
- ❑ **Radionuclides** - The 2004 SWAP included a finding that the System was “moderately susceptible” to radon-222, based on a single sample result of 870 picocuries per liter (pCi/L), and had a “low susceptibility” to other radionuclides. Since that determination, no additional water quality data have been provided for radon-222 or gross-beta. Therefore we cannot make a determination that the source of this elevated radon-222 concentration even remains on the System, as many of the previous sources have since been abandoned or disconnected. Two samples for gross-alpha resulted in findings below the detection limit. An assessment of System susceptibility to radionuclides cannot be completed without additional sampling for these contaminants, as recommended in Section 5.4.

5.0 STEERING COMMITTEE INTERACTIONS AND RECOMMENDATIONS

Garrett County officials convened a joint McHenry/Mountain Lake Park Source Water Protection Steering Committee comprised of officials representing Garrett County Department of Public Utilities. ALWI met with the Committee on two occasions; first on December 13, 2011 and again on April 30, 2012. Representatives of the Garrett County Department of Planning and

Land Development later became involved in the planning and review of SWPP elements.

5.1 INTER-JURISDICTIONAL COORDINATION

Though the Mountain Lake Park and McHenry water systems are owned, operated and maintained by Garrett County, other Systems subject to this MDE SWPP contract also exist within Garrett County jurisdiction. Though not directly maintained and operated by Garrett County, certain SWPAs for the City of Frostburg and the joint Midland-Lonaconing-Barton water system exist within Garrett County jurisdiction and are subject to the protections and enforcements of the Sensitive Areas Ordinance. The benefit of inter-jurisdictional coordination was discussed with and understood by representatives of each respective water system. The desire for inter-jurisdictional coordination was shared by Steering Committee members for each of these Systems.

Though source protection objectives differed slightly in detail from system to system, generally each of the four systems under this contract that are subject to the protections, restrictions and enforcements of the Sensitive Areas Ordinance shared the same general needs. Each of these systems required SWPA delineation updates and shared many of the benefits of the recommended Ordinance revisions.

5.2 ORDINANCES

We elected to focus our recommended ordinance revisions on the Sensitive Areas Ordinance for the following reasons:

1. A section of the Sensitive Areas Ordinance focused specifically on source water protection. Appendix B contains the source protection ordinance (i.e., Garrett County Sensitive Areas Ordinance No. 2010-06) as it existed at the start of this effort.
2. We believe that Garrett County would incur less of an administrative burden to revise the Sensitive Areas Ordinance (in contrast to revising other ordinances or creating a new ordinance) since it covers each of the water systems within Garrett County that are subject to the overall SWPP contract (McHenry, Mountain Lake Park, Midland-Lonaconing-Barton, and Frostburg).

The Steering Committee conceptually embraced an ALWI recommendation to achieve source water protection via ordinance revision, inasmuch as the delineations reflected on the existing Sensitive Areas Ordinance map do not portray all of the groundwater sources that were subject to this SWPP.

ALWI led Steering Committee discussions to explain how the Ordinance would be improved in both completeness (i.e., covering presently unprotected public supply wells) and clarity (by addressing certain ambiguities and inconsistencies in language) if it were superseded by incorporating the recommendations arising from the work performed under this contract. We explained how certain elements in the Ordinance would benefit from revisions to reduce ambiguities, particularly language regarding restrictions on petroleum products.

5.3 DELIBERATIONS AND AGREEMENTS

The Steering Committee enthusiastically supported the SWPP effort. Below is an outline of points that were discussed:

1. **Update to Sensitive Areas Ordinance Map** - We recommended and the Steering Committee agreed that the Sensitive Areas Ordinance map should be updated to reflect the delineations borne of this and other related SWPPs; see Chapter 2.0 for an explanation of delineations revisions. In addition to the changes for Mountain Lake Park (Figure 1), the map should be revised to reflect delineation updates for other Systems within Garrett County for which ALWI was contracted to develop SWPPs (i.e., the Koontz Reservoir SWPA for the Midland-Lonaconing-Barton water system is not reflected on the County map, nor are the SWPA re-delineations for all of the McHenry and Frostburg's Savage Run Watershed sources).
2. **Resolution of "Petroleum" Ambiguity** - Certain ambiguities existed in the Ordinance, with respect to restrictions on the presence and use of petroleum products. Considering that the EPA specifically excludes petroleum from its definition of "hazardous," attendees agreed that the petroleum ambiguity should be addressed. Changing "hazardous substances" to "hazardous substances and petroleum products" was presented as one workable way. A less desirable alternative also was discussed, which would involve defining "hazardous" to specifically include petroleum. This would require an insertion within the definitions section.
3. **Ordinance Revision to Include Parallel Protections for Spring Sources** - Presently, there only is language in the Ordinance regarding the protection of wells, specifically in §156.09.C(2) and (3). However, there is no similar language to extend such protections to spring sources. This is specifically germane to the Mountain Lake Park water system, as it relies on springs as a primary source of water. This also applies to the Frostburg water system. ALWI recommends that the Ordinance be revised to include equal protection for spring sources.
4. **Sensitive Areas Ordinance Reference to Storage in "Greater than Household Quantities"** - We recommended and the Steering Committee agreed that both clarity and flexibility would be enhanced by restricting this prohibition to the Zone 1 radii only.
5. **Community Involvement and Public Workshop** - The Steering Committee accepted the concept of public involvement in source water protection. Ordinance revisions require the review and voting approval by the County Commissioners. Applicable MDE guidance also recommends public involvement in the consideration and adoption of protective measures (such as the Ordinance revisions). The Steering Committees for each of the four related Systems came to agree to convene a joint public workshop on source water protection with the public input solicitation processes otherwise inherent to Ordinance(s) revision and adoption procedures. A joint workshop was held on May 15, 2013 (Appendix D) as a part of these public involvement processes.

6. **Energy Resources Development (General)** - Energy resources development in SWPAs garnered considerable discussion. While ALWI recommends broad energy resources facility restrictions within SWPAs, Steering Committee members were disinclined to embrace restrictions that could be construed as a disincentive for the economic investment that arises from energy resource development projects. County officials further advised that prior to acting on related ordinance initiatives, the County seeks to review the content of the Marcellus Shale Safe-Drilling Initiative Advisory Commission report, which reportedly is planned for completion in the summer of 2014.
7. **Wind Turbines** - We explained that wind turbines probably are not a significant concern because of the small quantities of lubricants and other petroleum products used. Our opinion is that wind turbines should be disallowed in Zone 1, but could be permissible in Zone 2 as long as the quantity of petroleum stored was not greater than household quantities.
8. **Coal Mines and Gas Well Exploration Projects** - We suggested that neither coal mines nor gas well exploration projects be allowed in source water protection areas. With the Steering Committee we discussed how the majority of threats surrounding gas well projects manifest in the storage and management of frack water, brines, and wastewaters at the land surface (and are not caused by subsurface hydrologic interference). While we discussed the economic importance of natural gas, we also observed that the SWPAs cover but a small portion of the County's overall acreage. Consequently the economic impact on the County, as a whole, should be relatively small if prohibitions are placed on gas and coal exploration within SWPAs. The Steering Committee deferred offering final guidance on this matter, as they are awaiting the findings of the Marcellus Shale Safe-Drilling Initiative Advisory Commission report.
9. **Unneeded Wells** - We discussed failed test wells, failed land development projects and other wells in or near SWPAs that no longer are needed. We recommended that unneeded wells be abandoned and sealed, as a method to further protect System sources.

As aforementioned, the Steering Committee focused on the ramifications of existing and/or potential energy resources development activities in SWPAs. Regardless of the outcome of the Marcellus Shale Safe Drilling Initiative report, ALWI recommends that the county prohibit drilling related to energy exploration within the SWPAs. This became a specific issue in connection with the large lease holdings of natural gas companies within certain SWPAs and the economic value of the petroleum resources and their associated benefit for jobs creation.

Steering Committee members came to feel that decisions on the restriction or prohibition of such activities would best be made only after reviewing the findings of the Marcellus Shale Safe-Drilling Initiative Advisory Commission report and then consulting with County Commissioners and other County officials. For this reason, at this time the prohibition of energy resources development projects within SWPAs remains an unaccepted recommendation.

5.4 ADDITIONAL RECOMMENDATIONS

ALWI has developed additional recommendations to improve overall source protection in light of the observations, analyses and interpretations presented herein:

1. **Limit Incompatible, Upgradient Land Uses** - Once the Marcellus Shale Safe-Drilling Initiative Advisory Commission report is published, we recommend that the Steering Committee promptly reach a final consensus and recommendation (to the Commissioners) on the energy resources exploration and development issue. If prohibition is infeasible or untenable, ALWI would recommend conservative and comprehensive baseline water quality analyses before any such energy project is approved to begin, as well as monitoring throughout the project's lifetime. Prohibitions requiring the application and uses of the best available protective techniques and technologies should be considered as well.
2. **Consider Land Acquisition** - Approximately 91% of the SWPA is forested, with approximately 281 acres (or 51%) of the SWPA owned and controlled by the Garrett County Sanitary District. This suggests that about 218 acres (or 44%) of the remaining forested lands within the SWPA are privately owned. As economically feasible, the System should consider purchasing such lands to better protect their sources from alternative land uses such as agriculture and natural resource exploration.
3. **Monitor Radionuclides Concentrations** - Considering the scant available radionuclide water quality data for our susceptibility analysis, the System should monitor radionuclide concentrations in the drinking water with greater frequency. Special attention should be paid to radon-222 concentrations, given the previous finding of susceptibility.
4. **Improve Site Security** - Certain well caps were without locks at the time of our field reconnaissance (e.g., Well 5). The System should install locks to secure all springs and wells, to limit access to all system sources.
5. **Promote Participation in Forest Conservation and Management Program** - The System also should consider encouraging landowners within the SWPAs to manage their forested lands by way of the Maryland Department of Natural Resources (DNR) Forest Conservation and Management Program. The program allows for a legal agreement between the landowner and the DNR to be recorded in the land records of the County in which the property is located. The landowner agrees to manage their forest land according to a plan that is prepared for the property in return for a reduced and/or frozen property tax assessment (generally reduced and frozen at a low agricultural rate). The minimum acreage to participate in the program is five acres and the minimum term of the agreement is fifteen years. If the agreement is breached through failure to comply with the plan, sale of the property to someone unwilling to assume the responsibility or a landowner who simply wants to be out of the program, back taxes will be levied and will be computed back to the beginning of the agreement. The agreement can be amended to increase or decrease acreage and it can be transferred to a buyer if the buyer is willing to assume the responsibilities of the agreement.

6. **Encourage Compliance With Applicable Nutrient Management Standards** - Though the System sources are not susceptible to nitrate contamination, there are agricultural properties relatively close to certain System sources. The System should consider requesting that MDE and Maryland Department of Agriculture carefully review environmental compliance matters at the agricultural facilities within and near the SWPAs. To the degree voluntary or enforced nutrient management compliance is not readily achievable, the System also should consider asking State officials to require strict nutrient management compliance practices at potential nutrient source properties within the SWPAs.

7. **Post “No Dumping” Signs Within SWPA** - Consideration should be given to posting “No Dumping” signs at various locations within the SWPAs to discourage the informal disposal of hazardous wastes and petroleum products. Similarly, the County should regularly reassess the SWPA for evidence of dumping, while removing unwanted debris and waste items.