

## **WATER RESOURCES ELEMENT**

### **Introduction**

The Town of Mardela Springs Water Resources Element is required by Article 66B of the Annotated Code of Maryland, as amended in 2006 by House Bill 1141.

The purpose of the Water Resources Element (WRE) is to ensure that any future development plans in Mardela Springs take into account the opportunities and limitations of local water resources. The WRE evaluates new growth potential and compares the pattern and pace of that growth to the availability of water supply sources, the capacity of water supply and sewage treatment infrastructure, and the ability of surface waters in the Town to receive the waste generated by both point and non-point sources. This will serve to better protect both State water resources and public health while meeting State Smart Growth policies.

The State of Maryland produced a guidance document in June of 2007 regarding the development and content of the Water Resources Element (*Managing Maryland's Growth, The Water Resources Element: Planning for Water Supply and Wastewater and Stormwater Management*, Maryland Department of Planning, 2007). A point of emphasis of that guidance is that the content of the WRE should be at a general level that is appropriate to the Comprehensive Plan. While one goal is to identify potential supply, infrastructure, or receiving water constraints early in the process, the outcome is to identify options to address any constraints that are identified or to identify that land use plan which creates the least impact on water.

### **Water Resources Goal**

The goal for the WRE is to evaluate water sources and water and sewer capacity for the desired growth of the Town of Mardela Springs. This includes ensuring that development occurs at a pace that the water resources can sustain, while reducing the potential for non-point source pollution in local waterways.

## **Water Supply**

The United States Geological Survey (USGS), in conjunction with the Maryland Geological Survey (MGS) and the Maryland Department of the Environment (MDE), is currently completing a three phase study of the groundwater resources in the Atlantic Coastal Plain of Maryland. Specifically, the USGS and MGS are currently in the process of developing a comprehensive regional database of aquifer information, which is expected to be completed and published as part of Phase One. Phase Two consists of filling in any gaps in existing knowledge and building resource management tools, such as a groundwater flow model, to be finalized by 2012. Phase Three, slated to start in 2010 and to end in 2013, consists of using the previously developed tools to manage and optimize resources. More information on this study can be found on the USGS website in a publication entitled, "A Science Plan for a Comprehensive Regional Assessment of the Atlantic Coastal Plain Aquifer System in Maryland," <http://pubs.usgs.gov/of/2007/1205>.

**Surficial Aquifer** (*formerly the Columbia Aquifer, the Salisbury Formation, and including the Paleochannel*)

This aquifer refers to the Columbia aquifer, the Salisbury Formation, and the Paleochannel, referenced in the Wicomico County 2010 Draft Water and Sewerage Plan. The Columbia aquifer more specifically refers to the water table of the surficial aquifer, while the Salisbury Formation refers to the surficial aquifer over the Delmarva region. The Paleochannel refers to a feature within the surficial aquifer that is an ancient buried underground riverbed, holding approximately seven billion gallons of water.

The majority of the surficial aquifer is below the surface anywhere from zero to 30 feet deep, with the Paleochannel, specifically, ranging from 100 to 200 feet below the surface. The aquifer, being shallow, is susceptible to surface contamination and should be protected. Though the availability of water is not an issue with this aquifer, water from the Paleochannel should be protected and used sparingly, as it is the major water source for the region. It is important to note that this aquifer receives recharge from precipitation in topographically high areas and supplies many small streams, manmade ponds, wells, and the tidal part of the Wicomico River with water.

### **Calvert Formation** *(formerly the Nanticoke Aquifer)*

This formation is described as the basal sands in western Wicomico County. There is little information about this formation, but those who use the aquifer have not documented any cases of significant draw down. The Town of Mardela Springs should review the USGS Coastal Plain Study for further information on this aquifer when it is published.

### **Jurisdictional Issues**

The surficial aquifer and the Calvert Formation cross political boundaries into other jurisdictions. Because of this, it is very important that the Town continues to coordinate with Wicomico, Somerset, Worcester, and Dorchester Counties to resolve any issues that may arise.

### **Saltwater Intrusion**

Saltwater and freshwater co-exist in coastal areas based on a balance of pressure, since saltwater is denser and sinks lower than freshwater resources. However, when significant withdrawals of freshwater are made on an aquifer, this balance becomes disrupted. An unequal pressure balance results, causing the saltwater to rise and possibly contaminate the freshwater aquifer. If the freshwater becomes contaminated, there is a large chance that the well will then pump saltwater. Therefore, in coastal areas, it is important to monitor groundwater withdraws in relation to the freshwater and saltwater interactions.

Saltwater intrusion is not considered a major threat to the surficial aquifer at this time. However, the MGS database will include a distribution of brackish water in major aquifers. Once the database is completed and the report published, Mardela Springs should review and decide on any further actions that may be necessary.

### **Stormwater Management**

Stormwater issues occur in many developed areas due to an increase in impervious surface. In natural areas, stormwater is slowed by existing vegetation, which allows the soil to absorb the majority of water. In cases of development, stormwater hits impervious surfaces, gathers, and travels to the nearest collection of water, whether it is a receiving stream or stormwater collection system. The Town of

Mardela Springs lies solely within the Nanticoke watershed and, as such, the receiving stream is the Nanticoke River.

Since the impervious surfaces cover the soil, water cannot be completely absorbed and used to recharge aquifers. Water picks up speed, since it cannot be absorbed and may cause scouring and erosion in a receiving stream. Additionally, stormwater cannot go through natural filtration for nitrogen and phosphorus removal while traveling along impervious surfaces, and instead, typically picks up more pollution from road salt, road residue, and tire residue. All of these factors combine to support the claim that untreated stormwater needs to be mitigated in order to reduce adverse effects to the receiving water bodies.

The Town of Mardela Springs has no specific stormwater management regulation; however the Town falls under the purview of Wicomico County for stormwater management issues. Wicomico County has a Stormwater Management Ordinance (Chapter 196: Stormwater Management) that covers all of the requirements for development in the County, including the Town of Mardela Springs. Chapter 196 details the regulatory power the Ordinance has over development, the exemptions allowed, and the details of obtaining a waiver or variance, if applicable. The Stormwater Management Ordinance additionally discusses what actions should be included for acceptable stormwater management, including the creation of stormwater management plans. The Stormwater Management Ordinance also discusses permitting, inspection, maintenance, appeals, severability, and penalties. Lastly, included in the Ordinance is a section on pipe installation detailing specific criteria for developers to follow. If, for some reason, the approved stormwater management plan is not followed or implemented properly, the County has established in its Ordinance a way to make sure the developer solves the issues or he/she will be penalized.

## **Water System**

The Town of Mardela Springs is the only municipality in Wicomico County that currently does not have its own water supply system. All residents of the Town are using private, individual wells. With a well system in the Town, and some failing septic systems, the Town is currently looking into the feasibility of creating a community centralized water system.

A consultant was hired by Mardela Springs in 2009 to identify and examine various options for providing community, regional water and sewer service to all of the residents of Mardela Springs. The study included a summary of site conditions and the extent and severity of public health / environmental conditions. The study also included a description of the various options for wastewater collection, disposal, treatment, and distribution. Design parameters and configurations for each option, as well as cost estimates were discussed.

The Town is currently in the process of setting up public meetings to discuss the findings and recommendations of the study in order to determine appropriate next steps. Implementation of a first-ever community water and sewer system will be costly, therefore the Town is looking at this endeavor as a long-term planning project dependent upon grant and/or loan monies for full implementation.

## **Sewer System**

The Town of Mardela Springs, likewise, is the only municipality in Wicomico County that does not have its own sewer system. The residents all use private, individual septic systems to treat all wastewater. The Maryland Department of Health and Mental Hygiene acknowledge that a potential public health hazard exists in the Town's service area due to failing septic systems. Due to this potential hazard and the proximity of many septic systems to the water supply, the Town, as previously mentioned, hired a consultant in 2009 to identify and examine various options for providing community, regional water and sewer service to all of the residents of Mardela Springs.

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## **Nutrient Loading Analysis**

To evaluate non-point source pollution loadings into receiving waters, Mardela Springs used the Nutrient Load Analysis Spreadsheet, which calculates non-point source pollution loadings based on different land use categories. The spreadsheet produces results that can be used to

show a general picture of non-point source pollution in the Town, while also providing support for more detailed studies as necessary.

The analysis consists of a simple before-and-after assessment of the change in nutrient loads due to proposed land use changes, as well as a comparison among alternative future land use plan options. The MDE developed the nutrient load calculation spreadsheet that serves as the default tool. The spreadsheet calculates base nitrogen and phosphorus non-point source loads for the year 2002 land use/land cover and septic systems by State Basin; the Lower Eastern Shore serves as the basin that encompasses the Town of Mardela Springs. However, for the purposes of this WRE, the model was run specifically for Mardela Springs.

The model uses three inputs: land use acreages, number of residential septic systems, and the acreage of non-residential land to be served by septic systems. The model was run to show the existing conditions of the Town of Mardela Springs and two other land use options. Each run of the model includes results summarized by watershed and jurisdiction.

The loading rates for future land use reflect implementation of best management strategies (BMPs) suggested in the associated Tributary Strategy. Some of the strategies included are: riparian buffers, erosion and sediment control, enhanced stormwater management, and nutrient management plan implementation (for agricultural areas). These strategies are built into the model to ensure that the loading outputs will reflect only the changes in land use patterns.

## **Growth Scenarios**

The Town of Mardela Springs ran the nutrient model for its existing conditions and two additional future land use situations. The additional future situations were based upon the Maryland Department of Planning's (MDP) development capacity analysis for the Town. MDP has prepared projections for the Town of Mardela Springs that indicate growth of 37 additional households through 2030. However, the MDP development capacity analysis indicated that zoning in the Town could accommodate only 15 new building units. Both growth scenarios were examined for water quality impacts. In addition, both scenarios were examined for impacts with and without a centralized water and sewer system. The first scenario assumed that 37 new residential units were added to the Town without having a centralized water or sewer system. No additional commercial land use areas were included in

scenario one. Similarly, scenario two assumed that there were only 15 new residential units in Mardela Springs, again, with no water or sewer system and no new commercial land area.

### **Nutrient Loadings**

The final loading outcomes show that without water and sewer service, development at either the 15 or 36 household levels will cause a net gain in nitrogen loads, but a decrease in phosphorus loads. The development of 37 households, scenario one, shows a net nitrogen increase of 163 pounds/year, from the existing load of 2,863 pounds/year to 3,026 pounds/year. Scenario two, development of 15 households, will increase nitrogen loads by only three pounds/year, raising the total load to 2,866 pounds/year. Phosphorus loads will be reduced by 22 pounds/year in scenario one and by six pounds/year for scenario two. Table #14 shows the model results.

The model was run two more times to show the nutrient loads if Mardela Springs invested in a centralized water and sewer collection system. With the water and sewer system, all growth scenarios would produce a net reduction in nitrogen and phosphorus loads. Nitrogen would be reduced by 1,566 pounds/year with scenario one and 1,536 pounds/year with scenario two. Phosphorus loads would retain the same reduction rates as without water and sewer systems.

While the typical thought is that more development would show a larger increase in nutrient levels, the model results show that the development of 37 households would provide less of an increase in nitrogen without water and sewer treatment and provide a larger reduction with water and sewer treatment. This outcome is largely due to the fact that more farmland would be developed and less fertilizer would be applied to the land. Regardless of the amount of development, however, the model results show that investing in a water and sewer system would be beneficial to the surrounding water quality.

The presence of a Total Maximum Daily Load (TMDL) is a sign that pollution control efforts must outweigh additional pollution impacts from future land use change and wastewater treatment plant flows to prevent further degradation of the waterbody. For the receiving waters in the Town of Mardela Springs without a nutrient TMDL, a determination of the suitability of receiving waters cannot be made. At this time, the Nanticoke River does not have a TMDL.

**TABLE #14  
NUTRIENT LOADING  
TOWN OF MARDELA SPRINGS**

| Jurisdiction    | Watershed              | Existing                  | Scenario 1<br>(37 Households) |                       | Scenario 2<br>(15 Households) |                       |
|-----------------|------------------------|---------------------------|-------------------------------|-----------------------|-------------------------------|-----------------------|
|                 |                        |                           | Nitrogen<br>(lbs. /yr.)       | Change<br>(lbs. /yr.) | Nitrogen<br>(lbs. /yr.)       | Change<br>(lbs. /yr.) |
| Mardela Springs | Nanticoke River        | 2,863                     | 3,026                         | 163                   | 2,866                         | 3                     |
|                 | (with water and sewer) | 2,863                     | 1,297                         | -1,566                | 1,328                         | -1,536                |
|                 |                        |                           |                               |                       |                               |                       |
|                 |                        | Phosphorus<br>(lbs. /yr.) | Phosphorus<br>(lbs. /yr.)     | Change<br>(lbs. /yr.) | Phosphorus<br>(lbs. /yr.)     | Change<br>(lbs. /yr.) |
|                 |                        | 108                       | 86                            | -22                   | 102                           | -6                    |
|                 | (with water and sewer) | 108                       | 86                            | -22                   | 102                           | -6                    |

### **Water Resources Recommendations**

This Water Resources Element has detailed numerous issues and constraints that need to be further addressed by the Town of Mardela Springs. Among the issues are aquifer quantity and quality as well as non-point source pollution. Additionally, sewer and water infrastructure capacity constrains growth in certain areas, unless properly expanded.

Therefore, the Water Resources Element recommendations for Mardela Springs are as follows:

- (1) Although saltwater intrusion is an issue that does not pose a threat to Mardela Springs currently, this issue should receive some focus in future discussions. The MGS, in conjunction with the USGS Coastal Plain Study, will create a database that will include a distribution of brackish water in major aquifers. Mardela Springs should be aware of this and take steps to prevent saltwater intrusion in the future.
  
- (2) The surficial aquifer and the Calvert Formation should be protected from surficial contamination. The aquifers are relatively close to ground level, leaving them more susceptible to surface contamination. Issues concerning

aquifer quantity and quality have been raised by research and by the public and Mardela Springs should be aware of such issues. The Town should work with MDE and Wicomico County to consider implementation of measures that will protect the quality of individual wells within the Town's jurisdiction.

- (3) Strong coordination between neighboring counties should be required due to the inter-jurisdictional breadth of the aquifers.
- (4) Constraints on growth include sewer and water infrastructure capacity in Mardela Springs, requiring capital improvements. Studying the feasibility of a water and sewer system is of utmost importance. Having these systems will increase efficiencies, reduce the potential health risk associated with septic systems, and further reduce nitrogen pollution.
- (5) The Maryland Department of Health and Mental Hygiene acknowledge that a potential health hazard exists within the Mardela Springs sewer service area due to failing septic systems. In addition, the Town has a well system that, coupled with failing septic systems, may be at risk for contamination. As such, the Town should utilize the recently completed community water and sewer feasibility study and work with its citizens, Wicomico County, and the Maryland Department of the Environment (MDE) to identify the most appropriate type of sewer system for Mardela Springs.
- (6) The Town, once a sewer and/or water system has been agreed upon, should work with Wicomico County and MDE to identify potential funding sources to implement the community sewer system in a way that is least burdensome, from a cost perspective, to the Town and its residents.
- (7) The Town should share the results of the feasibility study with both Wicomico County and MDE and work toward mutually beneficial goals with respect to centralized water and sewer systems in Mardela Springs for the planning period of this document.