TOWN OF
Poolesville
MARYLAND

Prepared by: D. Wade Yost, Town Manager

Poolesville's Water Supply Sustainability

Climate change, whether man-made or natural cycle, is projected to increased lengths of dry spells followed by heavy precipitation events. Currently, these severe weather cycles are observed in the West along with river-flow increases in the Midwest and the Northeast regions. Annual precipitation and very heavy precipitation events have increased nationally and are projected to further increase in our region. These fluctuations in weather patterns are expected to affect water demand, groundwater withdrawals, aquifer recharge, and potentially reducing groundwater availability in Maryland.

Poolesville relies on a number of State agencies that are involved with the protection of Maryland's groundwater resources, including the Maryland Department of the Environment (MDE). Through their Water Supply Program's Source Protection and Appropriation Division, they manage water withdrawals to ensure against unreasonable impacts on the water resource today and into the future. In partnership with MDE, we jointly consider risks, vulnerabilities, and opportunities associated with water and land use.

As with Poolesville, all water systems are better prepared through an ongoing process of assessing its vulnerabilities, developing and implementing adaptation measures to lessen expected impacts. Many of the recommended measures are "no-regrets" options defined as measures to strengthen the system's resilience and provide benefits under both current and potential climate change conditions.

Through efforts in the early 1990's to eliminate re-occurring water restrictions and preserve our most precious natural resource, many policies and well management practices were implemented providing mitigation strategies that are now being recommended by State agencies. During this time period the EPA approved the designation of our aquifer as a Sole Source Aquifer. This requires projects receiving federal funding to complete an Environmental Impact Statement. Information on the EPA Sole Source Aquifer Program can be found here: https://www.epa.gov/dwssa.

Water supply utilities can determine their climate change vulnerabilities based on location and system characteristics. To determine adaptation options, utilities are recommended to take the following steps: [1]

1. Evaluate current operating conditions in light of expected climate change impacts;
2. Integrate anticipated conditions under climate change into planning; and
3. Collaborate with other local utilities and/or regional planning agencies as a way to share knowledge and resources.
4. Adapt to changes in water availability… Manage the resource

Aquifer Management

Aquifers in Maryland fall into two major types: unconsolidated Coastal Plain aquifers found east of the Fall Line (a geologic divide that generally coincides with the Interstate 95 corridor), and hard rock aquifers found in the western part of the State.

Poolesville resides in the Piedmont region, where aquifers consist largely of fractured, consolidated bedrock. Successful groundwater production is dependent upon the size and number of water-bearing fractures encountered at a particular well site. Ground water in this region is derived from rain and snow that falls within the watershed where the well is located. [2]

With assistance from the Maryland Department of the Environment (MDE), The Town reviewed and calculated the potential water supply from existing and proposed well sources. A theoretical water availability assessment utilizing rainfall and acreage within the corporate boundaries was conducted by the MDE. It was determined that the groundwater availability was more than adequate to meet the Town's population projections of 6,500.

MDE's Water Supply Program (WSP) has the responsibility of minimizing groundwater withdrawal impacts through the Water Appropriations and Use Permitting process. Evaluation of Water Appropriations and Use Permits typically include:

- Demand analysis, aquifer testing,
- Fracture trace analysis,
- Water level monitoring,
- Evaluation of water balance, and
- Other similar investigations.

Groundwater data and modeling are also used in the evaluation. The MDE's review criteria are applied to determine whether the amount of water requested is reasonable for the proposed use, and whether the proposed use will adversely impact the resource or other users. Through the permit review process, the WSP attempts to assure that groundwater withdrawals do not exceed the sustained yield of the State's aquifers. [3]

Poolesville is divided into four watersheds. Withdrawal permits from each of these watersheds are based on data from the MDE Water Supply Program study completed in 2000. The estimated annual average base flow (effective recharge) in the nearest representative Triassic basin (Monocacy River @ Bridgeport) is 461 gallons per day (GPD)/avg/ac (6.2 in/yr), with an estimated drought year (1-in-10) baseflow of 290 GPD/ac (3.9 in/yr). When amounts are deducted for maintenance of a seasonal low stream flow (7 GPD/avg) and a 10% reduction for impervious surfaces is made, the amount of theoretical ground water available in each watershed is calculated. [4]

The table below displays the calculations from the 2000 MDE study. It included Well 10 and future Well11; however, subsequent to Well 10 construction, it developed iron bacteria and is currently

offline. Well 11 is budgeted for construction in the spring of 2017, and water sample analyses have indicated that it is of high quality and will need only the minimal treatment.

Well 14 has been drilled, permitted and scheduled to be brought online late in 2017. Current plans are to rebuild nearby Well 4 and provide radon removal treatment for both wells at the single site. Well 15 has been drilled, but won't be brought online until sometime in the future. All wells are strategically located throughout Town to reduce drawdown interference between sites. The total of the four watershed appropriation permits are 650,000 gpd for an annual daily average and 910,000 gpd for the daily average of the month of maximum use.

Watershed	Area (acres)	"Theoretically" Available groundwater (GPD)	Permitted Average Daily Allocation on a yearly basis (GPD)	Permitted Average Daily Allocation for Max. Month (GPD)	Well Capacity (GPD)	Permittable Average Daily Groundwater Remaining (GPD)
Horsepen Branch (Wells 2, 4, 6, 8, 11 & 14)	588	149,000	293,000	388,000	648,000	0
Broad Run (Well 12)	551	140,000	47,500	66,600	66,600	92,500
Dry Seneca Creek (Wells 3 5 & 13)	973	247,000	194,500	273,400	303,400	52,500
Russell Branch (Wells 7, 9 & 10)	450	115,000	115,000	182,000	352,800	0
Totals	2,562	651,000	650,000	910,000	1,370,800	145,000

In 2001, the Commissioners adopted a well field management plan. The plan provides for several additional redundant wells to be brought online, creating an accessible storage within the aquifer. In theory, the well field will be capable of producing well over the MDE withdrawal permit; however, pumping in excess of the MDE permit would negatively impact the aquifer.

This type of well field management reduces the drawdown and amount of water withdrawn from each well, while increasing overall well sustainability. When a well is overdrawn, water producing fractures become exposed to air creating a calcification process and can reduce the overall well yield. The ability to produce in excess of the withdrawal permit builds redundancy into the system for emergencies such as pump failures or contamination of other wells. The philosophy of withdrawing 650,000 GPD from

multiple wells rather than a few has proven to protect well yields and overall sustainability of the aquifer.

Well Management

MDE's Water Supply Program Office has been closely involved with Poolesville's efforts to develop adaptive approaches to protect the long term viability of each well and address the potential impact of drought conditions on its water resources. The Town has used:

- flow testing
- water level monitoring
- continuous pumping of individual wells during drought conditions while maintaining static water levels

As well pumps have been replaced; we have consulted with State and consultant hydrologists to determine the optimum depth at which to set each well's pump. This combined with the installation of flow regulating valves, enables us to attain the most efficient and sustainable pumping rate, and prevent the dewatering of the water bearing fractures. This is another example of proactive aquifer storage management.

In accordance with MDE's established protocol/analysis regime for all water suppliers, water quantity and quality monitoring occurs on a daily basis. Current analyses confirm that all of our wells, except for 2, 7, and 9, are continuing to produce high quality water requiring only minimal treatment (chlorine). With respect to Well 2, MDE determined that it was under the influence of surface water and requires cartridge filtration. Wells 7 & 9 had elevated levels of radionuclides, and the shared well house was constructed with radionuclide and radon removal treatment units.

Demand Management

Demand management strategies can include a variety of options, such as:

- Reducing losses from leakage,
- Implementing rate structures or rate surcharges that encourage customers to conserve,
- Providing incentives for customers to install low-flow fixtures or appliances,
- Working individually with large-volume users to identify potential water savings, and
- Using public outreach and education to encourage consumers to conserve water. [2]

Demand management is a means for extending water supplies and delaying or eliminating the need to develop new sources. Sound water use practices reduce the amount of stress that we place on our resources, both by limiting water withdrawals and by decreasing wastewater discharges. Managing demand is one important and relatively inexpensive alternative that water suppliers can use to protect their water supply.

Poolesville has partnered with Maryland Rural Water Association and implemented a water leak detection program. The program has been in effect for nearly 20 years and very successful. Identifying and repairing water leaks in public mains with specialized equipment minimizes water loss.

The Town's yearly Water Audit, preformed by an independent auditor, correlates billing information with actual pumping data to determine actual losses. By calculating water used and known losses, such as main breaks, fires or faulty meters, we can determine our system's integrity, and develop a plan and budget for remedial action.

The Town has utilized a tiered water rate structure for many years. For high end users, the tiered system applies a premium rate over lower end users, i.e., the more you use the higher the rate. This structured rate system is widely used and does encourage conservation.

Green Infrastructure

Managing stormwater using techniques such as rain gardens, porous pavement, and bio-swales helps to slow and filter runoff, increases groundwater recharge, and improve aquifer resiliency today and into the future. Green infrastructure practices can help communities prepare for and manage the effects of climate change effects and reduce losing valuable water that could be used or stored for use when it is needed most.

EPA recently conducted an analysis of the value of groundwater recharge that could be achieved through small storm retention alternatives for new development and redevelopment. The study found that stormwater retention requirements applied nationwide could lead to replenishment of groundwater reserves and stream flow. [5]

Maryland and Montgomery County through local stormwater management regulations, require that green infrastructure be implemented through retention or other requirements. In all cases, the Town and County work with developers to identify ways that green infrastructure, such as pervious pavement or bio-swales, can be incorporated into a development plan to maximize environmental and community benefits. Montgomery County Permitting Services provide design assistance and facilitate plan reviews and approvals for stormwater management plans that include green infrastructure.

Several of the Town's housing developments have incorporated these quantity and quality control techniques. From stormwater swales and ponds in the older subdivisions and Brightwell Crossing to the newly approved Westerly 7 subdivision that uses both bio-swales and pervious pavement, incorporating these key components is a critical tool for enhancing climate resiliency. All future developments or redevelopment projects should incorporate these types of mitigation measures. The Planning Commission should ensure that this remains as part of Poolesville's long-range water planning efforts.

Forest Conservation

In the past, the Town has accepted Forest Conservation fee-in-lieu's for some development projects. A fee-in-lieu is a mechanism in which a developer can pay a per square foot fee instead of planting trees.

Recently, the Planning Commission has taken a position of not accepting a fee-in-lieu and requiring onsite and offsite mitigation. The Planning Commission should consider codifying this position.

Population beyond 6,500

Poolesville has established a population cap of 6,500. Estimations using 3.2 persons per household suggests the current population approximately 5,500. Maryland State Planning Data reported a 5,201 population figure in 2015.

Any increase in the population cap must begin with the Town's Comprehensive Plan. The Plan is a multiyear vision and roadmap guiding or Town's decisions on population, where to build new homes, traffic issues and capital investments. The development of a comprehensive plan is the primary job responsibility of the Planning Commission. Whether the plan is labeled comprehensive or master, we are describing the same thing: putting down on paper the hopes, dreams, and aspirations a community holds for itself.

The drafting phase of the Comprehensive Plan can last over a year and include community meetings or public forums. State law requires public hearings before the draft plan can be adopted. Once adopted by the Planning Commission, the plan is forwarded to the Commissioners for consideration and final adoption.

When discussing a population increase, several factors must be evaluated:

- Wastewater capacity,
- Water capacity,
- Water storage capabilities,
- Land use impacts, and
- Above all else, **can the aquifer support additional growth?**

Expansion of any of the above requires State approval and will most likely involve rezoning, annexations, public works projects and the following:.

- An evaluation of how additional development beyond the current population cap could impact the hydrology of the area
- An increase in the water supply would necessitate the expansion of the permit and the theoretical recharge area. The only way to accomplish this is through annexation of land.
- Water supply infrastructure such as the storage tanks would need additional capacity for fire protection.
- An expanded wastewater treatment plant discharge would need to be increased which would require an expansion of the facility, and most likely additional nitrogen reduction treatment technologies to further reduce nitrogen loadings.

Poolesville's water system is adequately developed, managed and operated to meet the Comprehensive Plan's goals and objectives. For Poolesville to realize growth and land use changes beyond the current population cap, a significant amount of studies, planning and implementation must occur.

References:

[1] MDE, Climate Change Adaptation for Maryland Water Utilities. 2016

[2] Maryland Department of the Environment, Fact Sheet 19 Ground Water and Wells in the Maryland Piedmont

[3] Groundwater Protection Program Annual Report to the Maryland General Assembly 2012 Prepared by: Water Supply Program Water Management Administration

[4] Poolesville Master Plan, December 2011, Water Resource Element

[5 EPA, Green Infrastructure, Build Resiliency to Drought