PRINCE WILLIAM COUNTY

Department of Public Works
Thomas Smith, Director

MEMORANDUM

DATE: November 22, 2021

TO: Board of County Supervisors

FROM: Thomas Smith
Director of Public Works

THRU: Chris Martino
County Executive

RE: Update on Evaluation of Occoquan Watershed and Reservoir Protection Overlay District

EXECUTIVE SUMMARY

On November 17, 2020, the Board issued Directive No. 20-86 to staff to develop a protection overlay district for the Occoquan Reservoir. Staff updated the Board on August 3, 2021, regarding the evaluation of existing pollution concerns for the Occoquan Reservoir. Since that update, staff has had additional discussions with staff from Occoquan Watershed Monitoring Lab (OWML) and Northern Virginia Regional Commission (NVRC), as well as other stakeholder groups.

Most of the traditional pollutants of concern are being addressed by the Upper Occoquan Sewage Authority (UOSA) Regional Water Reclamation Plant and the existing non-point source programs and regulations, which include stringent stormwater management requirements, erosion and sediment controls, Chesapeake Bay Preservation Area regulations and the County's Municipal Separate Storm Sewer System (MS4) permit. Today, the main concern for the reservoir is increasing salinity, a common concern nationally. Salinity for the Reservoir is being addressed at the regional level with a large and diverse group of stakeholders with a Salt Management Strategy (SaMS). The stakeholders include localities, the Northern Virginia Regional Commission, Virginia Department of Environmental Quality, VDOT, ecologists, engineers, researchers, and technical experts from Virginia Tech.

The Salt Management Strategy (SaMS) has developed a tool kit to reduce the environmental impacts of winter maintenance projects to promote the best practices the residents can use around their properties. The tool kit is also designed to increase public awareness to influence positive behavioral changes to ensure public safety, improve water quality and lessen the effects of deicing salts on water resources with better practices and information-sharing on the practices over time. The County intends to implement the feasible recommendations in the SaMS toolkit countywide.

A reservoir protection overlay district is designed to protect the water supply through the regulation of land uses and higher stormwater management standards to protect water quality. The standards and

restrictions implemented within an overlay district should be based on the watershed characteristics, specific pollutants of concern and understanding of the efficacy of existing regulations to control those pollutants. Typically, an overlay district is a mechanism to adopt higher standards for jurisdictions that do not have adequate standards and restrictions countywide.

The County will be updating its Chesapeake Bay Preservation Area regulations, based on the recent changes in the State regulations. Additionally, the County will be receiving a new updated MS-4 Permit in June 2022 that will further strengthen the County's stormwater management standards. Considering these forthcoming changes in stormwater standards, staff recommends that the County focus on actively engaging with all stakeholders in addressing salinity as a region. The County staff will continue to actively participate with technical experts in addressing these challenges to understand and implement cost effective measures. Staff does not recommend an overlay district to address salinity, the specific pollutant of concern for the reservoir, at this time.

BACKGROUND

The drainage area for the reservoir encompasses 248 square miles of the County, which includes approximately 66% of the land area in the County. It includes four of the County's "major" watersheds: Occoquan River, Bull Run, Broad Run and Cedar Run. The boundary of the reservoir, based on the normal pool elevation, extends up to the Lake Jackson Dam on Occoquan Creek and up to the City of Manassas Park on Bull Run. Refer to Figure 1.

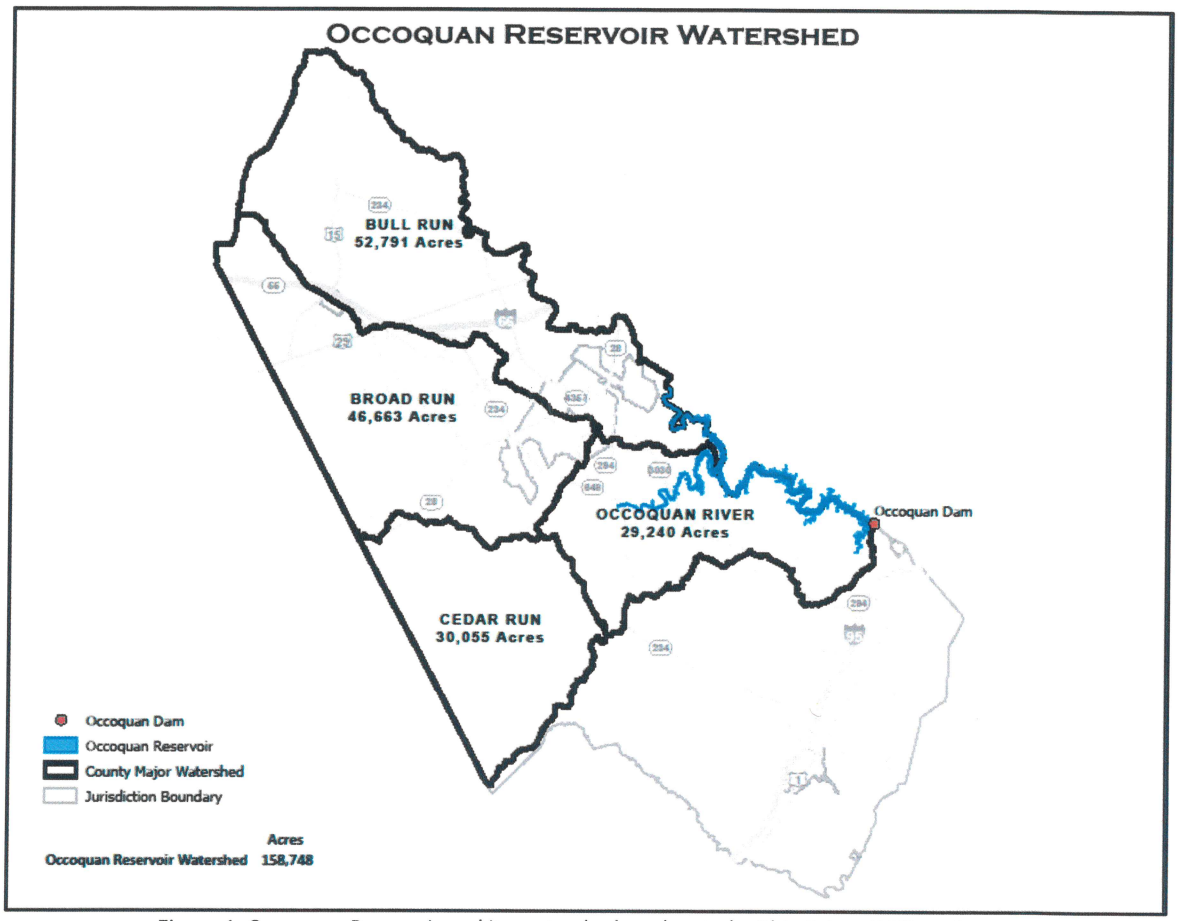

Figure 1. Occoquan Reservoir and its watershed are located within Prince William County

The Occoquan Reservoir was built in 1950 and then upgraded in 1957 to its current condition. In 1971 the Occoquan Policy was enacted, and the Occoquan Watershed Monitoring Laboratory (OWML) was created to monitor and report the water quality conditions in the reservoir. The Upper Occoquan Sewage Authority (UOSA) was created by Prince William County, Fairfax County, City of Manassas and City of Manassas Park. In 1978, UOSA's new regional water reclamation facility began operations and replaced eleven of the existing poorly functioning treatment plants. The facility was expanded in 1995 and again in 2005. It is a highly advanced treatment facility that has significantly improved the water quality of the reservoir.

Non-point source pollution was left up to localities to address through structural and non-structural best management practices (BMP's). Examples of these BMP's include more stringent stormwater management requirements, erosion and sediment controls and implementation of the Chesapeake Bay Resource Protection Areas. The County implemented new stormwater BMP requirements in 1982, for all watersheds draining into the reservoir, which was well in advance of state/federal regulations. In 1990, these new stormwater requirements were expanded to include the entire County. These requirements were then replaced in 2014 with the new Virginia Stormwater Management Program (VSMP) requirements. The County has also been involved with public education and outreach in both the urban and agricultural sectors. In addition, the County has been implementing water quality improvements on prior developed land that include stormwater facility retrofits, reforestation projects and stream restorations. See Figure 2 for a timeline of the County's water quality milestones.

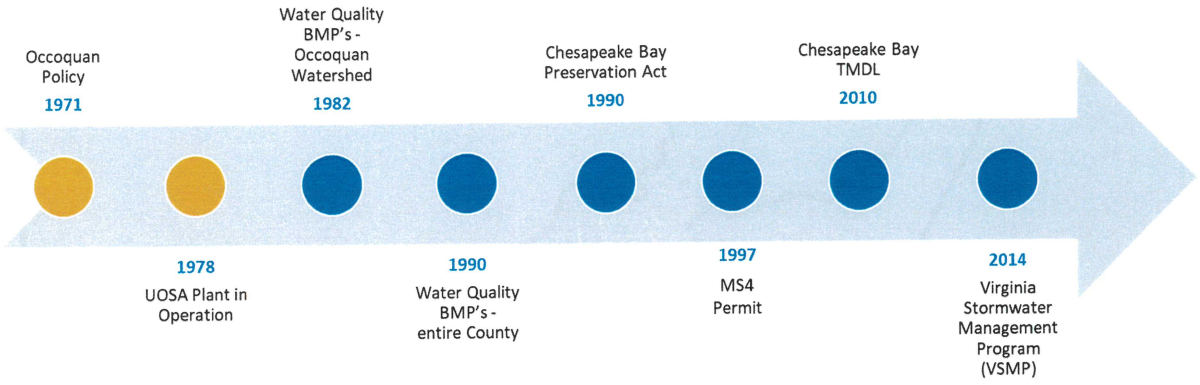

Figure 2. Timeline of the County's non-point source regulations and programs

Most development within the watershed occurred after 1982 after the new stormwater requirements were in place. Based on the 2016 National Land Cover Dataset the average impervious surface cover in the watershed is about 9.8%. The OWML has been measuring in-stream pollutants (nitrogen, phosphorous and sediment) since the 1980's and pollutant levels have remained at relatively stable levels despite an increase in development and associated imperviousness. One of the questions asked by one of the stakeholder groups was "how much of the reservoir watershed in the County is in the Rural Area?" Approximately 55% of the reservoir watershed is designated as rural, predominantly zoned A-1. See Figure 3.

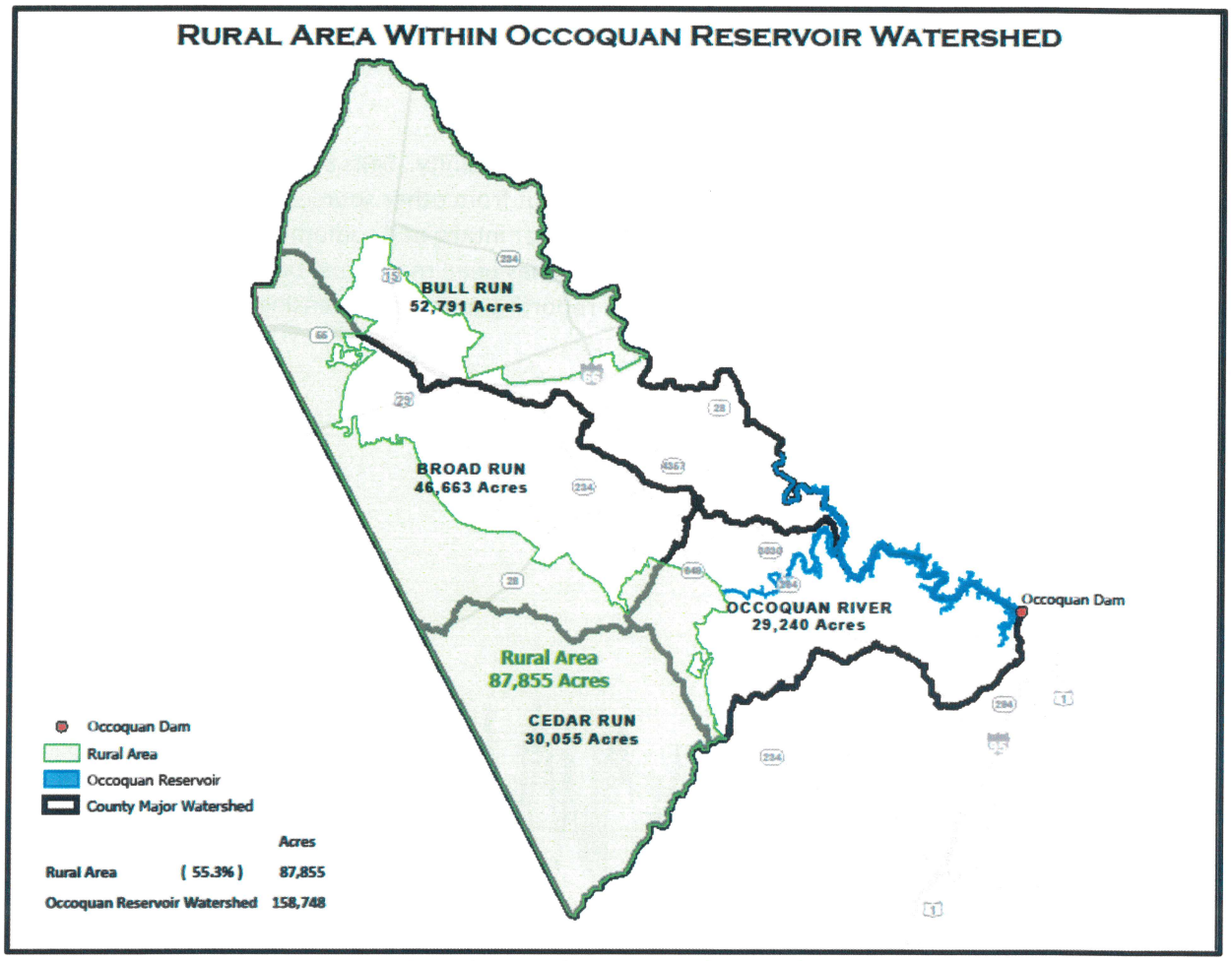

Figure 3. Rural Area within Occoquan Reservoir Watershed

CURRENT WATER QUALITY CONCERNS

The current water quality concerns for the reservoir as identified by OWML include Endocrine disrupting compounds (EDC's), Per- and poly fluorinated alkyl substances (PFAS) and increasing salinity

EDC's

Based on a recently concluded study of the Potomac River, EDC's are a growing concern for the region but the levels are still extremely low. EDC's appear to enter the reservoir through the treated wastewater and not something that can be addressed at the watershed level.

PFAS

Like EDC's, PFAS compounds appear to originate from the treated wastewater, so are more of a point source problem than a watershed problem. PFAS are a group of over 3,000 man-made chemicals that have been in use since the 1940's. They are used as lubricants, stain repellents and in firefighting foams. They are used in a wide range of manufacturing practices and found in many products including carpets, clothing, food packaging and cookware. Two of the most common types are PFOA and PFOS, which have been extensively produced and studied. Voluntary phase outs of these compounds by industry has occurred since 2002, but they still persist in the environment. The current EPA Health Advisory Level is

70 parts per trillion (ppt). Fairfax Water has detailed information and a factsheet on their website. According to Fairfax Water, the reservoir levels of combined PFOA and PFOS is only at 8 ppt and is not a major concern at the current time. These levels will continue to be monitored.

Salinity

The biggest problem for the reservoir appears to be increasing salinity. Salts such as sodium chloride occur naturally, but high levels of salts typically indicate input from other sources. Fairfax Water has been monitoring sodium concentrations at the drinking water intake and sodium concentrations have been increasing since 1980. Refer to Figure 4. The OWML has been measuring both sodium and chloride concentrations since the early 2000's and are reporting a similar increasing trend.

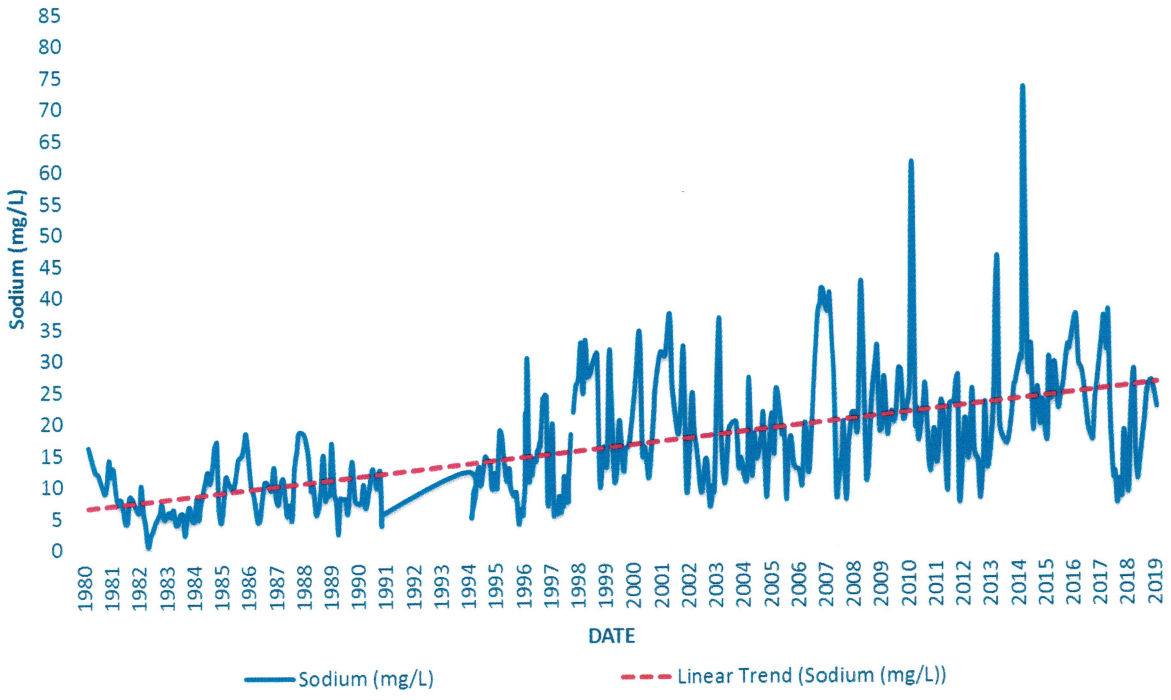

Figure 4. Sodium concentrations at drinking water intake

The source of salts appears to be from both the watershed as well as treated wastewater discharges, or sewershed. It appears that the application of road salts in the winter is the primary source from the watershed, but it doesn't account for all the observed increase. Sources from the sewershed include the water treatment process itself, industrial discharges and down drain disposal of salt-rich consumer products. Other potential sources include water softeners and saltwater pools.

Virginia Tech through a National Science Foundation grant is currently studying sources of salinity in the reservoir from both the watershed and the sewershed. The Northern Virginia region recently completed the Salt Management Strategy (SaMS) in December 2020. The effort was facilitated by Virginia Department of Environmental Quality and developed by a stakeholder advisory committee (SAC) to address the impact of road salts on water quality. The County was a member of the SAC. SaMS is a voluntary, non-regulatory toolkit for localities, winter service providers and non-profit organizations. It includes resources and recommendations for winter salt BMP's.

A major issue with salinity is that the treatment requires reverse osmosis, which would be very expensive to implement. Fairfax Water estimates around $1 billion to implement this type of treatment. So, the focus is on reducing the source, which will need to be addressed regionally.

Reservoir Protection Overlay Districts

Staff researched on Environmental Protection Agency's (EPA's) model ordinance designed to introduce higher standards to Reservoir Overlay Districts. EPA identified the Surface Water Protection Ordinance implemented in Greensboro, North Carolina as a model. Before adopting this ordinance, Greensboro did not have regulations to protect stream buffers, unlike in Prince William County, that has stream buffer protection countywide with Resource Protection Areas.

Fairfax County adopted a Water Supply Protection Overlay District in 1982 for the Occoquan Reservoir. It encompasses the drainage area to the reservoir and consists of two use limitations. The first is a water quality stormwater management requirement for development projects and the second is a detailed review of projects that use, store, or dispose of hazardous materials. As indicated earlier in this report, Prince William County adopted the same stormwater requirement countywide in 1982 as part of its stormwater ordinance, prior to majority of developments. More recent stormwater regulations have replaced this control measure with more stringent requirements in addition to MS-4 requirements on stormwater. The latest is the 2014 Virginia Stormwater Management Program regulations.

Staff also researched an effort in Stafford County several years ago to establish protection overlay districts for their three reservoirs. It was never adopted, most likely due to property rights issues encountered during the process.

CONCLUSION

Many of the original pollutant of concerns for the reservoir have been addressed through point source controls and early non-point source regulations and programs. These non-point source regulations and programs apply to the entire County and include stormwater management requirements, erosion and sediment controls, Chesapeake Bay Resource Protection Area protection, illicit discharge monitoring and enforcement and public education programs. The current pollutants of concern like increasing salinity will require additional studies to determine how best to address the issue and they will need to be addressed at a regional level. In the meantime, efforts like the region's Salt Management Strategy and outreach by NVRC's Clean Water Partners can begin to address issues related to road salt applications in the watershed.

Staff recommends that the update of the Chesapeake Bay ordinance and standards, and the current study on determining the sources of salinity in the reservoir, and implementation of Salt Management Strategies be completed and further evaluated before considering a reservoir overlay protection district to control salinity.

STAFF CONTACT INFORMATION

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