

**Department of Legislative Services**  
 Maryland General Assembly  
 2017 Session

**FISCAL AND POLICY NOTE**  
**First Reader**

House Bill 1045 (Delegate Cassilly)

Environment and Transportation

**On-Site Sewage Disposal Systems - Membrane Bioreactor (MBR) Technology - Regulations**

This bill requires the Maryland Department of the Environment (MDE), by October 1, 2018, to adopt regulations that encourage the use of membrane bioreactor (MBR) technology in on-site sewage disposal systems (OSDS, commonly referred to as septic systems) that (1) is more effective than the best available technology (BAT) for removal of nitrogen approved by MDE and (2) uses permeable micro- or ultra-filtration membrane technology for solids separation instead of specified current methods. The regulations must (1) update the evaluation criteria used in reviewing the design of an OSDS and in determining the adequate size of a sewage disposal area and (2) increase the maximum hydraulic loading rate that may be considered to 2.5 gallons per day per square foot (gpd/ft<sup>2</sup>) for a system using MBR technology and adjusted based on site-specific factors, including nutrient reduction requirements, percolation rates, and other site conditions and constraints.

The bill takes effect July 1, 2017.

**Fiscal Summary**

**State Effect:** Special/federal fund expenditures for MDE increase by \$82,200 in FY 2018 to hire one sanitarian to develop and implement the required regulations. Future year estimates reflect ongoing costs. Revenues are not affected.

(in dollars)	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Revenues	\$0	\$0	\$0	\$0	\$0
SF Expenditure	82,200	78,200	81,700	85,300	89,200
Net Effect	(\$82,200)	(\$78,200)	(\$81,700)	(\$85,300)	(\$89,200)

*Note:() = decrease; GF = general funds; FF = federal funds; SF = special funds; - = indeterminate increase; (-) = indeterminate decrease*

**Local Effect:** Local government expenditures may increase to (1) update regulations, as necessary, to reflect changes to State regulations related to MBR and (2) conduct training for employees related to the use of MBR. However, it is assumed that MDE assists with training. Revenues are not affected.

**Small Business Effect:** Potential meaningful.

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## Analysis

**Current Law:** MDE's Onsite Systems Division provides technical assistance and direction to county health departments and local approving authorities for the implementation of delegated programs for OSDS and individual wells. Additionally, Chapter 280 of 2009 generally prohibits a person from newly installing or replacing a septic system on property in the Chesapeake and Atlantic Coastal Bays Critical Area (Critical Area) unless the installed system utilizes BAT. MDE is required to assist homeowners in upgrading a septic system with money authorized for this purpose from the Septics Account of the Bay Restoration Fund (BRF) if sufficient funds are available.

Pursuant to current regulations, a person may not construct or attempt to construct an OSDS without first obtaining a permit from the appropriate approving authority. A person also may not alter an OSDS or cause it to receive any increase in flow or change in the character of wastewater unless permitted. A person must obtain an appropriate OSDS permit, well construction permit, public or private water supply system permit, or public or private sewerage permit before constructing or altering any structure, residence, floating home, or commercial establishment that is served or planned to be served by an OSDS or a private water supply system.

An approving authority must consider specific site evaluation criteria when determining whether to approve a lot or parcel for OSDS. In most cases, local requirements are the same as those outlined in State regulations; however, a county with delegated authority may choose to impose more stringent requirements than the State requirements. One of the criteria outlined in State regulations that must be considered by approving authorities is the subsurface application rate, or loading rate. Based on MDE guidance documents, for a typical domestic septic tank, the system should be designed with a maximum loading rate of 0.8 gpd/ft<sup>2</sup>. A lower loading rate may be required based on available site and soil information. Under specified conditions, a maximum loading rate of 1.2 gpd/ft<sup>2</sup> may be considered. The lower the loading rate, the larger the footprint for the OSDS.

For OSDS with a maximum (design) daily flow that equals or exceeds 5,000 gpd for the total project or property, whether utilizing one or more than one treatment unit or disposal field, plans must be jointly approved by MDE's Water Management Administration and

the local approving authority. The size of the sewage disposal area is generally determined in accordance with regulations.

MDE's Onsite Systems Division has numerous guidance documents regarding OSDS and individual wells, including a site evaluation training [manual](#) for on-site sewage treatment and disposal systems, a decision [framework](#) for evaluating project flows utilizing OSDS, [guidance](#) on wastewater flows for use in designing OSDS, and [guidelines](#) for large OSDS with a maximum accumulative flows greater than or equal to 5,000 gpd.

**Background:** According to MDE, there are approximately 420,000 septic systems in Maryland. Of these, 52,000 systems are located within the Critical Area. A conventional septic system removes much less nitrogen than a BAT system. A conventional system delivers approximately 23.2 pounds of nitrogen per year to the groundwater, while an upgraded BAT unit reduces a system's nitrogen load in half. As of August 2016, BRF has supported the installation of nearly 8,127 BAT systems, of which 4,842 upgrades were completed within the Critical Areas. Further, 214 homes were connected to public sewerage using BRF.

MDE advises that MBR technology is used for secondary wastewater treatment. A 2007 U.S. Environmental Protection Agency (EPA) wastewater management fact sheet on MBR states that the more conventional technologies that perform secondary treatment of municipal wastewater rely on microorganisms suspended in the wastewater to treat it. MBR is a newer technology that is increasing in use and overcomes many limitations of conventional systems. EPA advises that these systems have the advantage of combining a suspended growth biological reactor with solids removal via filtration. The membranes can be designed for and operated in small spaces with high removal efficiency of contaminants such as nitrogen, phosphorus, bacteria, biochemical oxygen demand, and total suspended solids. The membrane filtration system can essentially replace the secondary clarifier and sand filters in a typical activated sludge treatment system. Membrane filtration allows a higher biomass concentration to be maintained, thereby allowing smaller bioreactors to be used.

EPA further advises that the advantages of MBR systems over conventional biological systems include better effluent quality, smaller space requirements, and ease of automation. Specifically, MBRs operate at higher volumetric loading rates which result in lower hydraulic retention times. The low retention times mean that less space is required compared to a conventional system. Further, as noted above, the effluent from MBRs contains low concentrations of bacteria, total suspended solids, biochemical oxygen demand, and phosphorus. The primary disadvantage of MBR systems is the typically higher capital and operating costs than conventional systems for the same throughput. Operation and maintenance costs include membrane cleaning and fouling control as well as eventual membrane replacement. Energy costs are also higher because of the need for

air scouring to control bacterial growth on the membranes. In addition, the waste sludge from such a system might have a low settling rate, resulting in the need for chemicals to produce biosolids acceptable for disposal.

**State Expenditures:** MDE’s special/federal fund expenditures increase by \$82,188 in fiscal 2018, which accounts for a 90-day start-up delay. This estimate reflects the cost of hiring one sanitarian to develop and implement the required MBR regulations. It includes a salary, fringe benefits, one-time start-up costs (including the purchase of a vehicle), and ongoing operating expenses. The information and assumptions used in calculating the estimate are stated below:

- developing the regulations is an involved process that requires MDE to approve MBR manufacturers and vendors, develop operation and maintenance requirements, and establish and enforce the various components of the program, similar to the current process related to using BAT for OSDS;
- increasing the maximum hydraulic loading rate, as required under the bill, requires the development of advanced soil morphological descriptions and long-term verification and commitment to require the use of MBR technology; and
- MDE must provide training to local approving authorities in order to adequately implement the proper hydraulic loading rates.

Position	1
Salary and Fringe Benefits	\$58,848
One-time Vehicle Purchase	20,000
Equipment/Operating Expenses	<u>7,340</u>
<b>Total FY 2018 State Expenditures</b>	<b>\$82,188</b>

Future year expenditures reflect a full salary with annual increases and employee turnover and ongoing operating expenses.

**Local Expenditures:** The bill results in a significant change to the overall regulation of OSDS and sewage disposal areas. As a result, local governments need to increase field staff training and expertise in soil evaluations in order to properly understand the correlation between soil characteristics, landscape positions, and permeability testing as it relates to hydraulic loading rates and design limitations. Additionally, some local governments may need to update their local codes and regulations to align with the State regulations developed under the bill. Accordingly, local government expenditures may increase, although it is assumed that MDE assists with training.

**Small Business Effect:** To the extent that incorporating MBR changes the hydraulic loading rate, OSDS may have smaller overall footprints, which could potentially reduce development and construction costs. Small businesses that manufacture, sell, install, or

provide service for MBR systems may benefit from an increase in the demand for their products and services. Conversely, small businesses that manufacture, sell, install, or provide service for BAT and conventional systems, may be negatively affected.

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### **Additional Information**

**Prior Introductions:** None.

**Cross File:** None.

**Information Source(s):** Charles County; Maryland Department of the Environment; Department of Health and Mental Hygiene; U.S. Environmental Protection Agency; Department of Legislative Services

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Analysis by: Kathleen P. Kennedy

Direct Inquiries to:  
(410) 946-5510  
(301) 970-5510