

December 6, 2016

**To:** County Council

**From:** Aron Trombka, Senior Legislative Analyst

**Subject:** Life-Cycle Regulation of On-Site Wastewater Treatment Systems

This memorandum report responds to the County Council's request that the Office of Legislative Oversight (OLO) prepare a report that presents alternative models to regulate the maintenance and performance of on-site wastewater treatment systems. At present, Montgomery County regulates these systems only at the time of design and installation. This report presents case studies of communities that have adopted inspection and maintenance regulations over the entire life of an on-site wastewater treatment system.

This report is organized in four sections:

- **Section 1** provides background information on on-site wastewater treatment systems;
- **Section 2** presents five management models developed by the United States Environmental Protection Agency to improve the performance of on-site wastewater treatment systems;
- **Section 3** presents case studies of jurisdictions that have implemented life-cycle regulation of on-site wastewater treatment systems;
- **Section 4** presents OLO's observations from the information presented in this report.

## **SECTION 1: ON-SITE WASTEWATER TREATMENT SYSTEMS**

This section provides background information on on-site wastewater treatment systems.

### **1.A. Definition of On-Site Wastewater Treatment Systems**

Property owners not served by public sewerage facilities require on-site systems to treat wastewater generated from their properties. Multiple names exist for these systems including "septic systems," "private sewage disposal systems," and "on-site decentralized systems." This report refers to these systems as "on-site wastewater treatment systems" (or "OWTS"), the term used by the U.S. Environmental Protection Agency. The U.S. Environmental Protection Agency (USEPA) defines an OWTS as "a system relying on natural processes and/or mechanical components that is used to collect, treat, and disperse/discharge wastewater from single dwellings or buildings."<sup>1</sup>

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<sup>1</sup> United States Environmental Protection Agency, *Onsite Wastewater Treatment Systems Manual*, EPA/625/R-00/008, Glossary-3, February 2002.

OWTS employ varied designs and technologies. The efficacy of a particular OWTS is dependent on many local conditions including soil characteristics, the depth of the water table, topography, climate, the density of development, and other factors. State and local governments throughout the United States establish regulatory requirements for OWTS to address public health and environmental concerns. This report does not evaluate the relative efficacy of different OWTS designs and technologies. Rather, the purpose of this report is to describe alternative governmental OWTS inspection and permitting requirements intended to protect public health and the environment.

### **1.B. Public Health and Environmental Concerns**

Properly designed, installed, and maintained OWTS often have minimal effect on public health and the environment. However, poorly designed, installed, or maintained OWTS can contaminate groundwater and produce significant public health and environmental concerns. The U.S. Environmental Protection Agency has found that OWTS “are often significant contributors of pathogens and nutrients” in ground water and bodies of water.<sup>2</sup>

- **Public Health Concerns:** Substandard or malfunctioning OWTS can contaminate drinking water. A study by the USEPA estimated that 168,000 viral illnesses and 34,000 bacterial illnesses occur each year as a result of consumption of drinking water from systems that rely on improperly treated ground water.<sup>3</sup> The USEPA has concluded that proper use of OWTS “reduces the risk of disease transmission and human exposure to pathogens, which can occur through drinking water, surface water, and shellfish bed contamination.”<sup>4</sup> In addition, properly treated wastewater can recharge ground water and replenish aquifers.
- **Environmental Concerns:** Substandard or malfunctioning OWTS also contribute to an overabundance of nutrients in inland surface waters and coastal estuaries. Increases in nitrogen and other nutrients in surface waters leads to excessive algae growth and harmful reductions in dissolved oxygen levels.<sup>5</sup> Proper wastewater treatment removes nutrients that pollute from surface water.

Despite these concerns, communities throughout the United States experience public health and environmental problems resulting from improper on-site wastewater management. According to the USEPA, many OWTS “are improperly managed and do not provide the level of treatment necessary to adequately protect public health and surface and ground water quality.”<sup>6</sup>

### **1.C. County Regulation of Residential On-Site Wastewater Treatment**

Approximately 22,000 properties in Montgomery County are served by on-site wastewater treatment systems. The County requires property owners to obtain a permit prior to the construction, reconstruction, alteration, or addition of an OWTS. County regulations also require a permit for the

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<sup>2</sup> United States Environmental Protection Agency, *EPA Guidelines for Management of Onsite/Decentralized Wastewater Systems*, EPA-832-F-00-012, page 1, July 2 000.

<sup>3</sup> United States Environmental Protection Agency, *Onsite Wastewater Treatment Systems Manual*, page xiv.

<sup>4</sup> United States Environmental Protection Agency website, *Septic Systems Overview*, <https://www.epa.gov/septic/septic-systems-overview>.

<sup>5</sup> United States Environmental Protection Agency, *Onsite Wastewater Treatment Systems Manual*, page xiv.

<sup>6</sup> United States Environmental Protection Agency, *Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems*, EPA 832-B-03-001, page 3, March 2003.

correction of existing failing OWTS. In addition, the County obligates a property owner to obtain a new permit when “the use of an existing building or facility changes because of an increase in the volume of waste, there is an increase in the number of bedrooms, or the composition of the waste entering the system is being changed.”<sup>7</sup>

As detailed in the County’s *Ten-Year Comprehensive Water Supply and Sewerage Systems Plan*, the Department of Permitting Services (DPS), is responsible for the permitting of OWTS. An applicant for an OWTS permit (called a “septic” permit) must provide DPS with information about the size of the dwelling unit to be served by the new or modified system as well as engineering plans detailing the design and location of the proposed system. DPS reviews applications to assure that the proposed system is in compliance with County regulations (found in Chapter 27A of the Code of Montgomery County Regulations).

County policy requires two tests prior to installation of an OWTS. The following two tests are intended to assure that OWTS conform to public health and environmental standards and regulations:

- **Water Table Test:** The first test determines the depth from the surface to the highest level of saturated soil (the “water table”). Unsaturated soil above the water table provides area for treating wastewater. Sufficient vertical distance is necessary between the OWTS drainfield trench and the top of the water table to prevent untreated wastewater from entering the ground water. DPS performs water table testing in the late winter through early spring when the ground water levels are at their highest.
- **Percolation Test:** The second test determines the speed at which wastewater effluent flows downward through the soil (the “percolation” rate). An overly rapid flow rate does not provide sufficient time for the unsaturated soil to treat the wastewater prior to its entry into the water table. A slow flow rate will fail to properly distribute the wastewater through the drainfield and could cause the system to back up.

**Montgomery County**  
***Ten-Year Comprehensive Water Supply and Sewerage Systems Plan***  
**(Approved November 2003)**

The County’s Department of Permitting Services (DPS), Well and Septic Section, is responsible for the administration and enforcement of County and State laws and regulations governing on-site, individual sewerage systems....

DPS fulfills these responsibilities by reviewing preliminary plans and record plats for properties served by on-site systems, issuing permits for, and inspecting, the construction of new and replacement systems, and by responding to complaints concerning on-site systems. Testing a property for a new septic system involves two tests: 1) the water table test to determine the probable highest level of water-saturated soil, and 2) the percolation test to determine the speed at which fluids percolate through the soil. (page 4-62)

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<sup>7</sup> COMAR, 27A.00.01.03

Following permit approval, DPS inspects OWTS after the trenches have been dug to full length and depth and the septic tank has been installed. DPS conducts a second inspection following the installation of all stone, pipe and geotextile fabric and the connection of the septic tank to the trenches.

As stated on the County's website, the testing and permitting requirements are intended to ensure that OWTS meet regulatory requirements "at least when ... septic systems are installed."<sup>8</sup> In other words, the County currently has no protocol to routinely inspect an existing OWTS for adequate function or possible failure after initial installation of the system. Moreover, as stated in the *Ten-Year Comprehensive Water Supply and Sewerage Systems Plan*, "DPS does not currently maintain a comprehensive database of septic problems throughout the County."<sup>9</sup>

DPS maintains records of permitted OWTS in the County. In addition, the Department responds to complaints about OWTS and takes enforcement action when necessary to achieve compliance with regulatory requirements.

The next section of this report presents alternative models to regulate and improve the performance of existing OWTS.

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<sup>8</sup> Department of Environmental Protection website, *Private Well and Septic Service*, <https://www.montgomerycountymd.gov/DEP/water/private-wells-and-septics.html>

<sup>9</sup> *Ten-Year Comprehensive Water Supply and Sewerage Systems Plan*, page 4-62.

## SECTION 2: OWTS MANAGEMENT MODELS

In the United States, state, local, and tribal governments are responsible for establishing and enforcing OWTS-related laws and regulations.<sup>10</sup> However, most jurisdictions limit regulation of OWTS to permitting at the time of installation. As noted by USEPA, “few programs address onsite system operation and maintenance, resulting in failures that lead to unnecessary costs and risks to public health and water resources.”<sup>11</sup>

As is the predominant practice in the United States, Montgomery County focuses its regulation of OWTS on approval of initial design and inspection of a new system at the time of installation. The County does not require any post-installation OWTS inspection nor does it mandate any on-going system maintenance. Nonetheless, as described in Section 1.B., existing OWTS that are not properly maintained can produce significant public health and environmental concerns. The USEPA describes the importance of life-cycle management of OWTS:

“Proper management of decentralized systems involves implementation of a comprehensive, life-cycle series of elements and activities that address public education and participation, planning, performance, site evaluation, design, construction, operation and maintenance, residuals management, training and certification/licensing, inspections and monitoring, corrective actions, recordkeeping/inventorying/reporting, and financial assistance and funding.”<sup>12</sup>

This section presents five management models developed by the United States Environmental Protection Agency (USEPA) as part of voluntary national guidelines intended to improve the performance of OWTS. The five models appear in a 2003 USEPA publication, *Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems*.<sup>13</sup> The five models presented below are conceptual approaches to life-cycle management with progressively increasing controls. The controls in each of the five models exceed current requirements in place in Montgomery County. The following pages briefly explain each of the models. A description of each model excerpted from the USEPA guidelines appears in the shaded boxes below. Additional details about each model appear in the table on page 11.

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<sup>10</sup> United States Environmental Protection Agency, *Onsite Wastewater Treatment Systems Manual*, page 2-6.

<sup>11</sup> *Ibid.*, page xiv.

<sup>12</sup> United States Environmental Protection Agency, *Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems*, EPA 832-B-03-001, page 3, March 2003.

<sup>13</sup> *Ibid.*

## 2.A. Model #1: Homeowner Awareness

USEPA's first level model is called "Homeowner Awareness." EPA considers this model appropriate in areas with low environmental sensitivity where OWTS require minimum owner attention. This model includes two primary components:

1. **The regulatory authority documents and inventories all OWTS located in the jurisdiction; and**
2. **The regulatory authority routinely sends periodic notices to remind property owners of the need for regular OWTS maintenance.**

This model features shared responsibility between the government and property owners. The government must incur the cost to develop and maintain an accurate and up-to-date database of OWTS and to implement a procedure for routine notification of property owners. Property owners, in turn, are responsible for voluntarily entering into contracting with service providers to perform necessary OWTS maintenance functions. This model further requires the availability of properly trained service providers in the area.

### **EPA OWTS Management Model #1** *Homeowner Awareness*

This program specifies appropriate management practices where treatment systems are owned and operated by individual property owners in areas of low environmental sensitivity, i.e., no restricting site or soil conditions such as shallow water tables or drinking water wells within locally determined horizontal setback distances. This model is applicable where treatment technologies are limited to conventional systems, which are passive and robust treatment systems that can provide acceptable treatment under suitable site conditions despite a lack of attention by the owner. Failures that might occur and continue undetected will pose a relatively low level of risk to public health and water resources. The objectives of this management model are to ensure that all systems are sited, designed, and constructed in compliance with sound, prevailing rules; all systems are documented and inventoried by the regulatory authority; and system owners are informed of the maintenance needs of their systems through timely reminders. The model is intended to provide an accurate record of the types and location of installed systems, to raise homeowners' awareness of basic system maintenance requirements, and to better ensure that the homeowners attend to those deficiencies that overtly threaten public health. This model, like all management programs described in this guidance, suggests the use of only trained and licensed/certified service providers. This model is a starting point for enhancing management programs because it provides communities with a good database of systems and their application for determining whether increased management practices are necessary.<sup>14</sup>

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<sup>14</sup> United States Environmental Protection Agency, *Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems*, EPA 832-B-03-001, page 19, March 2003.

## 2.C. Model #2: Maintenance Contract

USEPA recommends the “Maintenance Contract” model in areas where more complex OTWS designs are needed to properly treat wastewater. This model includes three primary components (the first two being identical to those of Model #1, the Homeowner Awareness model).

1. **The regulatory authority documents and inventories all OWTS located in the jurisdiction;**
2. **The regulatory authority routinely sends periodic notices to remind property owners of the need for regular OWTS maintenance; and**
3. **The regulatory authority may not permit an OWTS unless the property owner has a current contract with a trained and licensed service provider to perform proper and timely maintenance.**

Similar to the Homeowner Awareness model, this model also divides responsibility between the government and property owners albeit at a heightened level for both entities. Under this model, the property owner bears the responsibility and cost of entering into an on-going maintenance contract. For the government, this model adds the responsibility and cost to regulate compliance with the maintenance contract requirement. The local availability of trained and licensed service providers is an essential element of the Maintenance Contract model.

### **EPA OWTS Management Model #2** *Maintenance Contract*

The Maintenance Contract Model employs more complex system designs to enhance the capacity of conventional systems to accept and treat wastewater or where small clusters are used. For example, pretreating wastewater to remove non-biodegradable materials and particulate matter that typically pass through a septic tank may enhance subsurface infiltration system performance on marginally suitable sites (sites with limited area, slowly permeable soils, or shallow water tables). However, such pretreatment units can have mechanical components and sensitive treatment processes, which require routine observation and maintenance if they are to perform satisfactorily. Maintenance of these more complex systems is critical to sustaining acceptable protection in these areas of greater environmental sensitivity. Therefore, these systems should be allowed only where trained operators are under contract to perform timely operation and maintenance. The objectives of this model build on the Homeowner Awareness Model by ensuring that property owners maintain maintenance contracts with trained operators.<sup>15</sup>

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<sup>15</sup> *Ibid.*, page 19.

## 2.C. Model #3: Operating Permit

USEPA recommends the “Operating Permit” model in areas where sustained performance of OWTS is critical to protect public health and water quality. This model includes two primary components:

1. **The regulatory authority issues limited-term operating permits that are renewable for another term if the property owner demonstrates that the system is in compliance with the terms and conditions of the permit; and**
2. **The regulatory authority establishes performance requirements that include different maintenance, treatment, and inspection standards for different areas of the jurisdiction.**

In contrast to the previous two models, the Operating Permit model requires the government to expand OWTS regulation beyond initial installation to include periodic re-permitting during the active life of the system. The government would incur the cost of creating a re-permitting process as well as the cost of implementing all inspection and testing protocols associated with re-permitting. Under this model, the property owner bears the responsibility and cost of maintaining the OWTS as necessary to meet regulatory standards throughout the life of the system. In most cases, the property would have to contract with a maintenance service provider. The local availability of trained and licensed service providers is an essential element of the Operating Permit model.

### **EPA OWTS Management Model #3** *Operating Permit*

The Operating Permit Model is recommended where sustained performance of onsite wastewater treatment systems is critical to protect public health and water quality. Examples of locations where this program might be appropriate include areas adjacent to estuaries or lakes where excessive nutrient concentrations may be a concern or situations where a source water assessment has identified onsite systems as potential threats to drinking water supplies. EPA strongly recommends that this be the minimum model used where large-capacity systems or systems treating high-strength wastewaters are present.... A principal objective of this management program is to ensure that the onsite wastewater treatment systems continuously meet their performance criteria. Limited-term operating permits are issued to the property owner and are renewable for another term if the owner demonstrates that the system is in compliance with the terms and conditions of the permit. In subareas where it is appropriate to use conventional onsite system designs, the operating permit may contain only a requirement that routine maintenance be performed in a timely manner and the condition of the system be inspected periodically. With complex systems, the treatment process will require more frequent inspections and adjustments, so process monitoring may be required. An advantage to implementing the program elements and activities of this management program is that the design of treatment systems is based on performance criteria that are less dependent on site characteristics and conditions. Therefore, systems can be used safely in more sensitive environments if their performance meets those requirements reliably and consistently. The operating permit provides a mechanism for continuous oversight of system performance and negotiating timely corrective actions or levying penalties if compliance with the permit is not maintained. To comply with these performance standards, the property owner should be encouraged to hire a licensed maintenance provider or operator.<sup>16</sup>

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<sup>16</sup> *Ibid.*, pages 19-20.

## **2.D. Model #4: Responsible Management Entity Operation and Maintenance**

USEPA recommends the “Responsible Management Entity Operation and Maintenance” model where large numbers of onsite and clustered systems must meet specific water quality requirements because the sensitivity of the environment is high. Under this option, a public or private “responsible management entity” (RME) is responsible for maintaining OWTS. This model includes three primary components:

- 1. The regulatory authority issues operating permits to an RME rather than to the property owner;**
- 2. The RME is responsible for retaining the requisite managerial, financial, and technical capacity to implement on-going long-term operation and maintenance of OWTS in compliance with regulatory standards; and**
- 3. The property owner pays a service fee to the RME.**

The RME Operation and Maintenance model shifts most responsibility from the property owner and the government to a third party. The property owner’s responsibility is limited to paying a service fee; the government must only establish regulatory standards for on-site wastewater treatment. (States may need to establish a regulatory structure to oversee service fee rate setting.) The RME assumes responsibility for all other OWTS operation and maintenance functions.

### **EPA OWTS Management Model #4** *Responsible Management Entity Operation and Maintenance*

The Responsible Management Entity (RME) Operation and Maintenance Model is recommended where large numbers of onsite and clustered systems must meet specific water quality requirements because the sensitivity of the environment is high, e.g., wellhead protection areas or shellfish waters. Frequent and highly reliable operation and maintenance is required to ensure water resource protection. Issuing the operating permit to an RME instead of the property owner provides greater assurance of control over performance compliance. This allows the use of performance based systems in more sensitive environments than the Operating Permit Model. For a service fee, an RME takes responsibility for the operation and maintenance. This approach can reduce the number of permits and the administration functions performed by the regulatory authority. System failures are also reduced as a result of routine and preventive maintenance. The operating permit system is identical to that of the Operating Permit Model except that the permittee is a public or private RME. States may need to establish (and some already have) a regulatory structure to oversee the rate structures that RMEs establish and any other measures that a public services commission would normally undertake to manage private entities in noncompetitive situations.<sup>17</sup>

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<sup>17</sup> *Ibid.*, page 20.

## **2.E. Model #5: Responsible Management Entity Ownership**

The “Responsible Management Entity Ownership” model is a variation of the RME Operation and Maintenance model, with the exception that ownership of the OWTS resides with the RME rather than with the property owner. The RME serves as a type of regional sewerage provider that owns, operates, and manages a collection of OWTS. Under this model, the RME is solely responsible for all elements of OWTS management including planning, installation, operation, and maintenance. The RME would have the authority to upgrade or replace existing systems as necessary or to install clustered systems to serve multiple properties. USEPA recommends the RME Ownership model where new, high-density development is proposed in the vicinity of sensitive receiving waters. This model includes three primary components (the first being identical to those of the RME Operation and Maintenance model).

- 1. The regulatory authority issues operating permits to an RME rather than to the property owner;**
- 2. The RME owns, operates, maintains, upgrades, and replaces OWTS in compliance with regulatory standards; and**
- 3. The government implements a funding mechanism to support the RME.**

This model places all OWTS planning, installation, operation or maintenance responsibility exclusively with the RME. The property owner served by the OWTS retains none of these responsibilities. The government establishes regulatory standards, maintains a permitting function, and devices a program for funding the RME.

### **EPA OWTS Management Model #5** *Responsible Management Entity Ownership*

The Responsible Management Entity Ownership Model is a variation of the RME operation and maintenance concept in the RME Operation and Maintenance Model, with the exception that ownership of the system is no longer with the property owner. The designated management entity owns, operates, and manages the decentralized wastewater treatment systems in a manner analogous to central sewerage. Under this approach, the RME maintains control of planning and management, as well as operation and maintenance. This management model is appropriate for environmental or public health conditions similar to those for the RME Operation and Maintenance Model, but Model 5 provides a higher level of control of system performance. It also reduces the likelihood of disputes that can occur between the RME and the property owner in the RME Operation and Maintenance Model when the property owner fails to fully cooperate with the RME. The RME can also more readily replace existing systems with higher-performance units or clustered systems when necessary. EPA recommends implementation of the management practices detailed in the RME Ownership Model in cases such as where new, high-density development is proposed in the vicinity of sensitive receiving waters. States might need to establish a regulatory structure to oversee the rate structures that RMEs establish and any other measures that a public services commission would normally undertake to manage entities in noncompetitive situations.<sup>18</sup>

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<sup>18</sup> *Ibid.*, page 20.

## Summary of USEPA On-site Wastewater Treatment System Management Models

TABLE 1: SUMMARY OF MANAGEMENT MODELS	TYPICAL APPLICATIONS	PROGRAM DESCRIPTION	BENEFITS	LIMITATIONS
<b>MODEL 1 - HOMEOWNER AWARENESS MODEL</b>				
<ul style="list-style-type: none"> <li>• Areas of low environmental sensitivity where sites are suitable for conventional onsite systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Systems properly sited and constructed based on prescribed criteria.</li> <li>• Owners made aware of maintenance needs through reminders.</li> <li>• Inventory of all systems</li> </ul>	<ul style="list-style-type: none"> <li>• Code-compliant system.</li> <li>• Ease of implementation; based on existing, prescriptive system design and site criteria.</li> <li>• Provides an inventory of systems that is useful in system tracking and area-wide planning.</li> </ul>	<ul style="list-style-type: none"> <li>• No compliance/problem identification mechanism.</li> <li>• Sites must meet siting requirements.</li> <li>• Cost to maintain database and owner education program.</li> </ul>	
<b>MODEL 2 - MAINTENANCE CONTRACT MODEL</b>				
<ul style="list-style-type: none"> <li>• Areas of low to moderate environmental sensitivity where sites are marginally suitable for conventional onsite systems due to small lots, shallow soils, or low-permeability soils.</li> <li>• Small clustered systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Systems properly sited and constructed.</li> <li>• More complex treatment options, including mechanical components or small clusters of homes.</li> <li>• Requires service contracts to be maintained.</li> <li>• Inventory of all systems.</li> <li>• Service contract tracking system.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduces the risk of treatment system malfunctions.</li> <li>• Protects homeowner investment.</li> </ul>	<ul style="list-style-type: none"> <li>• Difficulty in tracking and enforcing compliance because it must rely on the owner or contractor to report a lapse in a valid contract for services.</li> <li>• No mechanism provided to assess effectiveness of maintenance program.</li> </ul>	
<b>MODEL 3 - OPERATING PERMIT MODEL</b>				
<ul style="list-style-type: none"> <li>• Areas of moderate environmental sensitivity such as wellhead or source water protection zones, shellfish growing waters, or bathing/water contact recreation.</li> <li>• Systems treating high-strength wastes or large-capacity systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Establishes system performance and monitoring requirements.</li> <li>• Allows engineered designs but may provide prescriptive designs for specific receiving environments.</li> <li>• Regulatory oversight by issuing renewable operating permits that may be revoked for noncompliance.</li> <li>• Inventory of all systems.</li> <li>• Tracking system for operating permit and compliance monitoring.</li> <li>• Minimum for large-capacity systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Allows systems in more environmentally sensitive areas.</li> <li>• Operating permit requires regular compliance monitoring reports.</li> <li>• Identifies noncompliant systems and initiates corrective actions.</li> <li>• Decreases need for regulation of large systems.</li> <li>• Protects homeowner investment.</li> </ul>	<ul style="list-style-type: none"> <li>• Higher level of expertise and resources for regulatory authority to implement.</li> <li>• Requires permit tracking system.</li> <li>• Regulatory authority needs enforcement powers.</li> </ul>	
<b>MODEL 4 - RESPONSIBLE MANAGEMENT ENTITY (RME) OPERATION AND MAINTENANCE MODEL</b>				
<ul style="list-style-type: none"> <li>• Areas of moderate to high environmental sensitivity where reliable and sustainable system operation and maintenance (O&amp;M) is required, e.g., sole source aquifers, wellhead or source water protection zones, critical aquatic habitats, or outstanding value resource waters.</li> <li>• Clustered systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Establishes system performance and monitoring requirements.</li> <li>• Professional O&amp;M services through RME (either public or private).</li> <li>• Provides regulatory oversight by issuing operating or NPDES permits directly to the RME. (System ownership remains with the property owner.)</li> <li>• Inventory of all systems.</li> <li>• Tracking system for operating permit and compliance monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>• O&amp;M responsibility transferred from the system owner to a professional RME that is the holder of the operating permit.</li> <li>• Identifies problems needing attention before failures occur.</li> <li>• Allows use of onsite treatment in more environmentally sensitive areas or for treatment of high-strength wastes.</li> <li>• Can issue one permit for a group of systems.</li> <li>• Protects homeowner investment.</li> </ul>	<ul style="list-style-type: none"> <li>• Enabling legislation may be necessary to allow RME to hold operating permit for an individual system owner.</li> <li>• RME must have owner approval for repairs; may be conflict if performance problems are identified and not corrected.</li> <li>• Need for easement/right of entry.</li> <li>• Need for oversight of RME by regulatory authority.</li> </ul>	
<b>MODEL 5 - RESPONSIBLE MANAGEMENT ENTITY (RME) OWNERSHIP MODEL</b>				
<ul style="list-style-type: none"> <li>• Areas of greatest environmental sensitivity where reliable management is required. Includes sole source aquifers, wellhead or source water protection zones, critical aquatic habitats, or outstanding value resource waters.</li> <li>• Preferred management program for clustered systems serving multiple properties under different ownership (e.g., subdivisions).</li> </ul>	<ul style="list-style-type: none"> <li>• Establishes system performance and monitoring requirements.</li> <li>• Professional management of all aspects of decentralized systems through public/private RMEs that own or manage individual systems.</li> <li>• Qualified, trained, owners and licensed professional owners/operators.</li> <li>• Provides regulatory oversight by issuing operating or NPDES permit.</li> <li>• Inventory of all systems.</li> <li>• Tracking system for operating permit and compliance monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>• High level of oversight if system performance problems occur.</li> <li>• Simulates model of central sewerage, reducing the risk of noncompliance.</li> <li>• Allows use of onsite treatment in more environmentally sensitive areas.</li> <li>• Allows effective area-wide planning/watershed management.</li> <li>• Removes potential conflicts between the user and RME.</li> <li>• Greatest protection of environmental resources and owner investment.</li> </ul>	<ul style="list-style-type: none"> <li>• Enabling legislation and/or formation of special district may be required.</li> <li>• May require greater financial investment by RME for installation and/or purchase of existing systems or components.</li> <li>• Need for oversight of RME by regulatory authority.</li> <li>• Private RMEs may limit competition.</li> <li>• Homeowner associations may not have adequate authority.</li> </ul>	

### **SECTION 3: CASE STUDIES**

This section presents case studies of four jurisdictions that have implemented life-cycle regulation of the OWTS. In each case, the State or County approves design and inspects OWTS at the time of system installation (as is done in Montgomery County) but also mandate additional on-going notification, maintenance, and/or maintenance requirements throughout the operational life of the system. The case studies selected by OLO each align with the USEPA “Homeowner Awareness,” “Maintenance Contract,” or “Operating Permit” models (models #1, #2 and #3) described in the previous section. This report does not present case studies from the two USEPA “Responsible Management Agency” models (models #4 and #5) as these approaches represent more far-reaching regulation than previously discussed by the Council.

Each of four case studies includes elements of USEPA management models #1, #2, and #3. The case studies appear on the next four pages, including descriptions of OWTS programs in:

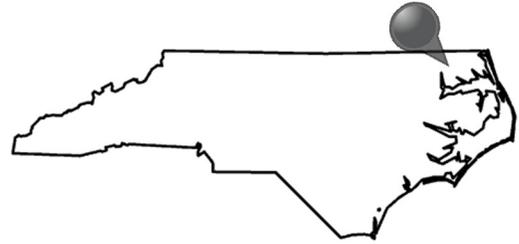
1. Albemarle Region, North Carolina
2. Fairfax County, Virginia
3. Monroe County, Florida
4. Hamilton County, Ohio

Following a brief overview of OWTS in the jurisdiction, the case study presents summary information about:

- The number of on-site wastewater systems;
- Inspection/maintenance requirements;
- Enforcement practices;
- Program management and staffing;
- Budget and funding; and
- Data management.

**CASE STUDY:  
ALBEMARLE REGION, NORTH CAROLINA**

**Overview:** Seven counties located in mostly rural, northeast North Carolina participate in a regional public health agency, Albemarle Regional Health Services (ARHS). In 1993, the County and municipal governments in the region authorized the establishment of a management entity to inventory and monitor the condition of OWTS. Under the management of ARHS, the local governments formed the Albemarle Septic Management Entity to, among other things, permit and perform routine mandatory inspections of OWTS.



**Number of On-Site Wastewater Systems:** The region includes approximately 7,000 OWTS, mostly serving residential properties.

**Inspection/Maintenance Requirements:** Property owners are required to maintain OWTS in proper operating condition and must sign a contract agreeing to annual inspection of their systems. The maintenance/inspection agreement is entered into the land record for the property. Public health inspectors perform annual inspections of each OWTS.

**Enforcement:** ARHS will not issue an OWTS permit unless the property owner agrees to annual inspections. If an OWTS fails its annual inspection, the property must make repairs at his/her own cost to bring the system back into regulatory compliance. If the property owner does not make the required repairs, then the ARHS will conduct the work and put a lien on the property to recover the cost of the work.

**Management and Staffing:** Seven certified public health inspectors perform annual OWTS inspections along with other responsibilities. The program director estimates that his staff spends between two to three work years combined on OWTS inspections.

**Budget and Funding:** The Albemarle Septic Management Entity has an annual operating budget of about \$290,000. The primary source of operating revenue is user fees. Residents with OWTS on their property pay a one-time lot evaluation fee of \$225 and a one-time permit fee of \$225. In addition, residents pay an annual system inspection fee of \$60 per year.

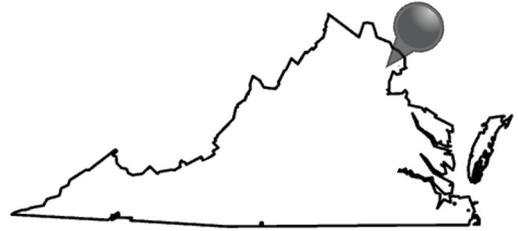
**Data Management:** ARHS developed and maintains a database of all OWTS in the seven counties served by the Albemarle Septic Management Entity. The database includes information about the permit and inspection status of each system and generates annual inspection notices and bills.

**Sources:**

- United States Environmental Protection Agency, Septic Systems Case Studies and Demonstration Projects, [https://www.epa.gov/sites/production/files/2015-06/documents/decentralized-case-study\\_albemarle-region-nc-2.pdf](https://www.epa.gov/sites/production/files/2015-06/documents/decentralized-case-study_albemarle-region-nc-2.pdf).
- Telephone interview with Ralph Hollowell, Director, Albemarle Environmental Health Department, October 26, 2016.

**CASE STUDY:  
FAIRFAX COUNTY, VIRGINIA**

**Overview:** The State of Virginia regulates OWTS. Fairfax County first adopted local OWTS requirements in 1928. Most recently, Fairfax County enacted ordinance to require inspection, operation and maintenance contracts, and routine pumping for all OWTS.



**Number of On-Site Wastewater Systems:** Approximately 23,000 OWTS exist in Fairfax County, mostly serving residential properties.

**Inspection/Maintenance Requirements:** Virginia mandates that all OWTS be pumped at least every five years. Virginia established additional requirements for “alternative” OWTS (for example, a system that does not result in a point source discharge). Property owners with alternative systems must contract with a licensed provider to annually inspect and perform regular maintenance to assure that the OWTS meets all performance standards. Property owners bear the cost for OWTS inspection, maintenance, and pumping which typically range between \$400 and \$600 per year (excluding repair costs). The certified contractor must provide documentation to the County demonstrating compliance with all inspection, maintenance, and pumping requirements.

**Enforcement:** Fairfax County seeks to achieve compliance through routine notifications and education. The State requires that property owners receive an operations and management manual for their specific OWTS design upon installation of a new system or property sale. The Virginia General Assembly recently approved legislation authorizing civil penalties for property owners who fail to provide documentation of proper OWTS inspection and maintenance.

**Management and Staffing:** The Fairfax County Health Department administers the OWTS program. Six field inspectors perform inspection of newly installed or repaired systems. (Private providers conduct the mandatory annual inspections for existing systems.) In addition, the Health Department allocates about one-quarter of an FTE to manage OWTS program data and documentation.

**Budget and Funding:** The annual operating budget for the Fairfax County OWTS program is approximately \$1.6 million. Permit fees offset about 30% of annual operating costs; State and County resources cover remaining costs. One-time permit fees vary by the system size and design but generally range between \$500 and \$700 (including all State and County fees combined).

**Data Management:** The Health Department maintains a database of all OWTS in the County. The database includes information about the permit and inspection status of each system.

**Sources:**

- United States Environmental Protection Agency, Septic Systems Case Studies and Demonstration Projects, [https://www.epa.gov/sites/production/files/2015-06/documents/decentralized-case-study\\_fairfax-county-va-2.pdf](https://www.epa.gov/sites/production/files/2015-06/documents/decentralized-case-study_fairfax-county-va-2.pdf).
- Telephone interview with Adrian Joye, Director, Environmental Health Program Manager, Fairfax County Health Department, October 27, 2016.

**CASE STUDY:  
MONROE COUNTY, FLORIDA (2007)**

**Overview:** Monroe County encompasses the Florida Keys, an environmentally sensitive area, particularly vulnerable to the effects of water pollution. In response to deteriorating conditions of coastal waters and marine habitats, the State of Florida in 1999 adopted more stringent wastewater treatment standards for Monroe County.



**NOTE:** *Monroe County is currently in multi-year period to transition nearly every residential property to public sewer service. The information and data in this case study reflects conditions in 2007 when nearly all properties were served by on-site wastewater systems.*

**Number of On-Site Wastewater Systems:** About 30,000 OWTS existed in Monroe County in 2007. (Within two years, fewer than 100 active OWTS could exist in Monroe County.)

**Inspection/Maintenance Requirements:** In order to receive an OWTS permit, property owners are required to sign an affidavit agreeing to hire a private sector contractor to maintain their system in accordance with performance standards. The affidavit is entered into the land record for the property. Maintenance contractors must be certified by the product manufacturer and must inspect each system twice per year; public health officers inspect each system annually.

**Enforcement:** The Florida Department of Health will not renew OWTS permits for property owners who fail to comply with inspection and maintenance requirements. Operating an OWTS without a permit could subject the property owner to civil fine under Florida law.

**Management and Staffing:** In Florida, OWTS are regulated by County offices of the State Department of Health. In 2007, the Monroe County office of the Florida Department of Health employed five OWTS inspectors.

**Budget and Funding:** The 2007 operating budget for the Monroe County OWTS program was approximately \$300,000. The OWTS permit fee is \$100 for two years.

**Data Management:** The Department of Health hired a private entity to develop and maintain a database of OWTS in Monroe County. The database includes information about the permit, inspection, and maintenance status of each system. Information in the database is searchable and available to the public online.

**Sources:**

- United States Environmental Protection Agency, Septic Systems Case Studies and Demonstration Projects, [https://www.epa.gov/sites/production/files/2015-06/documents/decentralized-case-study\\_monroe-county-fl-2.pdf](https://www.epa.gov/sites/production/files/2015-06/documents/decentralized-case-study_monroe-county-fl-2.pdf) .
- Telephone interview with William Brookman, Director Community Health Services, Florida Department of Health in Monroe County, October 28, 2016.

**CASE STUDY:  
HAMILTON COUNTY, OHIO**

**Overview:** The State of Ohio has relatively weak OWTS requirements. In 1993, in response to concerns regarding bacteria and viruses in surface waters, the Hamilton County Board of Health adopted OWTS regulations that are significantly more stringent than State requirements.



**Number of On-Site Wastewater Systems:** Approximately 20,000 OWTS exist in Hamilton County.

**Inspection/Maintenance Requirements:** As a condition of the OWTS permit, Hamilton County requires each non-mechanical system be inspected every 58 months. (The County established the requirement two months short of five years to allow inspections to rotate through different seasons of the year.) Mechanical OWTS must be inspected at least once per year. In addition, the County mandates that owners of mechanical systems enter into annual maintenance, monitoring, and service contracts with a vendor certified by the manufacturer of the system. The certified contractor must provide documentation to the County demonstrating compliance with all inspection, maintenance, and performance requirements.

**Enforcement:** Hamilton County regulations authorize the Board of Health to revoke permits for noncompliance. Violators are subject to criminal prosecution if required corrective actions are not taken. The County may also put a lien on a property to cover delinquent inspection fees.

**Management and Staffing:** A public entity called Hamilton County Public Health administers the OWTS program. Hamilton County Public Health employs nine dedicated sanitarians to inspect OWTS for compliance with all operations and maintenance standards.

**Budget and Funding:** The annual operating budget for the Hamilton County OWTS program is about \$900,000. The program is almost entirely funded by user fees. For non-mechanical systems, the current inspection fee is \$90 and the operating permit fee is \$43 (each paid every 58 months). For mechanical systems, the current inspection fee is \$43 and the operating permit fee is \$21 (each paid annually).

**Data Management:** Hamilton County Public Health maintains a database of OWTS in the County. The database includes information about the permit and inspection status of each system. The database also provides access to design drawings for each system. Private inspectors are able to submit reports directly into the database. Property owners can access the database online to receive inspection results. Information in the database is also stored in GIS format to allow mapping of OWTS to assist in environmental remediation and complaint response efforts.

**Sources:**

- United States Environmental Protection Agency, Septic Systems Case Studies and Demonstration Projects, [https://www.epa.gov/sites/production/files/2015-06/documents/decentralized-case-study\\_hamilton-county-oh-2.pdf](https://www.epa.gov/sites/production/files/2015-06/documents/decentralized-case-study_hamilton-county-oh-2.pdf).
- Telephone interview with Chris Griffin, Director, Hamilton County Public Health Division of Water Quality, October 31, 2016.

## SECTION 4: OLO OBSERVATIONS

OLO culled the following observations while preparing the report. These observations are intended to inform Council consideration of whether to implement life-cycle OWTS regulation:

- Education and Outreach: Most communities with life-cycle OWTS management programs include an education and outreach effort. At a minimum, the regulatory agency periodically reminds property owners of the need to properly maintain their systems. Some communities further require that property owners receive an operations and management manual for their specific OWTS design upon installation of a new system or upon sale of the property.
- Inspections: Communities with life-cycle OWTS management programs establish re-inspection periods ranging from every six months to every five years. In some jurisdictions, the re-inspection period varies based on the type of system. Public sector personnel perform inspections in some communities; in others, certified private sector firms perform inspections and report the results to the local health department (or equivalent).
- Maintenance Requirements: Several communities mandate life-cycle maintenance of OWTS by requiring property owners to contract with a certified private sector system maintenance firm. In some communities, the property owner must document that the system had been pumped within a designated period of time.
- Permitting and Enforcement: All communities with life-cycle OWTS regulations require compliance with local inspection and maintenance requirements a condition for permit renewal. Some jurisdictions also subject violators to civil fines and/or criminal prosecution. In addition, some State and local laws allow for a lien to be put on a property to cover unpaid fees or the cost of corrective actions.
- Program Staffing: Implementation of a life-cycle OWTS management program requires staff for program management, data management, and most notably, field inspections (if performed by the public sector personnel). Based on staffing levels in other communities, a single full-time inspector could perform between 1,000 and 3,000 inspections per year. Multiple factors affect how many inspections a staff member could perform per year including the variety of OWTS system designs, the complexity of the inspection, and the travel time needed between inspection locations.
- Budget and Funding: Different communities have adopted different approaches to funding their OWTS programs. Some set permit and inspection fees in the hundreds of dollars so that user charges cover all or nearly all of the cost of the program. Others only recover a small portion of program costs from user charges, and so, rely on general government or other resources to cover costs. For some communities, annual public sewer user rates are a relevant reference point for evaluating the reasonableness of OWTS fee charges.

- Data Management: At a minimum, a life-cycle OWTS management program requires a data management system that (a) retains information about the permit and inspection status of individual systems, and (b) generates annual inspection notices and bills. Some jurisdictions have developed and maintain their own OWTS program database; others contract with a vendor to provide this service. Some data management systems have an online capability that allow the public to search the data and permit private inspection firms to directly upload reports. One community stores OWTS data in GIS format to allow mapping of OWTS to assist in environmental remediation and complaint response efforts.
- Transition: Several of the OTWS program directors interviewed by OLO spoke of the importance of a well-planned transition to life-cycle OWTS regulation. The directors stressed the need to establish clear rules along with a robust outreach program to educate property owners of new requirements. In addition, the program directors advised that the County should expect the transition period to bring a measure of public discontent, particularly from property owners who have not been paying for on-going OWTS maintenance.