

## **The University of Georgia On-Site Waste Treatment Demonstration and Training Facility for Educating On-site Waste Professionals in Georgia**

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### **Abstract:**

In land areas where public sewage collection and disposal is not available, on-site sewage management systems (OSSMS) are designed and used to safely treat and disperse domestic sewage, the sewage generated by individual households and small businesses. These decentralized OSSMS are commonly called septic systems or septic tanks. In Georgia, OSSMS are regulated by the Georgia Department of Public Health (DPH). Data from the DPH, indicates that over 17,000 OSSMS are installed annually in Georgia (DPH Digital Health Department, 2019). With this number of systems being installed it is necessary to ensure proper siting, installation and operation and maintenance of OSSMS. DPH provides property owners, stakeholders, regulators and industry educational training for the purpose of standardization and protecting the health and safety of the public and environment. To assist DPH with training OSSMS professionals and stakeholders, a Graduate Student from Emory University along with faculty in the UGA Crop and Soil Sciences Department and DPH has redesigned a teaching, demonstration, and training facility on the UGA Griffin Campus. The facility has been redesigned to provide a hands-on education place to better prepare the DPH Environmental Health Specialist (EHS), Soil Scientist, OSSMS installers, pumpers and maintenance contractors, UGA Extension Agents, and homeowners. The facility includes a working tank and distribution lines, serial trenches, and display boxes of various Georgia approved distribution systems, and a profile wall of distribution systems. During the conference presentation, the overall training program includes both a classroom session where the basics of OSSMS are explained and the outdoor portion where the participants can get the needed hands-on experience with various aspects of the OSSMS.

### **Introduction:**

On-site sewage management systems help manage the waste from approximately 1.7 million properties in Georgia. The typical OSSMS consists of a primary treatment tank and an absorption trench designed to disperse wastewater into the soil for secondary treatment. A two-compartment septic tank with an effluent filter on the outlet provides primary treatment. The septic tank serves as a settling basin for suspended solids and a holding tank to allow for microbial decomposition of organic materials in the wastewater. Secondary treatment is achieved by dispersing wastewater through an absorption field consisting of subsurface absorption trenches filled with a medium to provide structural support, void space and soil surface for additional microbial treatment as the wastewater moves through the soil (Bauske et al., 2013).

Georgia is a home ruled state, historically, the regulation of OSSMS was a function of the 159 local county boards of health. Legislation adopted in 1997 reconfigured this regulatory framework. The primary change was to centralize the regulatory authority at the state level. The

Department of Public Health (DPH), the Official Code of Georgia Annotated 31-2-7, was granted authority to adopt statewide rules and regulations for OSSMS, approve onsite sewage management system products prior to use in the state, and credentialing the workforce associated with site evaluations, permitting and inspections, installation, and maintenance of OSSMS. The county boards of health, under O.C.G.A. 31-3-5, are limited to regulate in six specific areas: 1. Specifying locations where OSSMS can be used. 2. Specifying minimum lot sizes for onsite sewage management system use. 3. Specifying the types of residences, facilities and buildings that may be served by onsite sewage management systems. 4. Issuing permits for the installation of systems. 5. Inspecting systems upon the completion of installation. 6. Provide for the ongoing maintenance of such systems. Although permitting and enforcement are carried out through the county boards of health, the regulations for the standards and criteria for OSSMS are promulgated by DPH. As part of that authority, the DPH has the responsibility to certify County Board of Health staff, septic tank installers, pumpers, maintenance personnel, and soil scientist as stated in Rules of the Department Chapter 511-3-1-.16 and the DPH Manual for On-site Sewage Management Systems; Section N-Certification (hereafter known as the DPH Manual) (Kumnick, 2019).

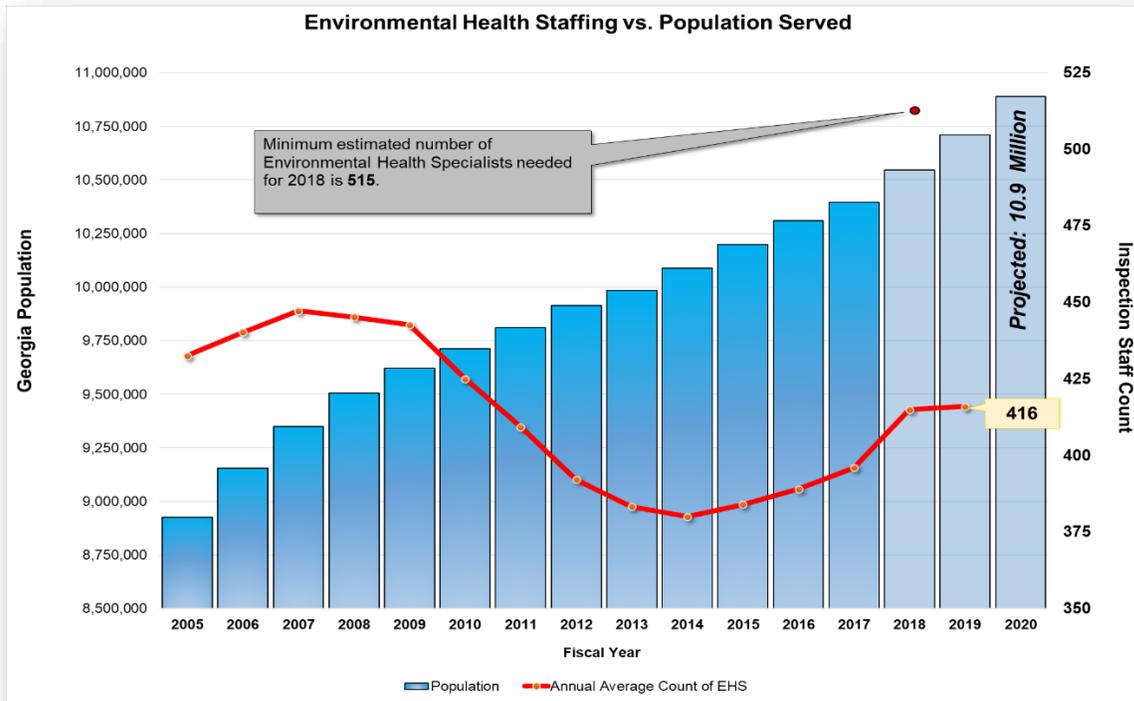
On-site waste treatment systems are designed and installed according to the DPH Manual for the treatment of on-site wastewater and to protect water quality. Those persons that perform services as a soil classifier, septic tank contractor, inspection personal, maintenance personnel, or sewage pumpers must be certified by the Department. State certification requires for each professional to initially demonstrate knowledge, in their capacity, by passing the appropriate DPH tests on the rules and regulations for OSSMS. Certification is then renewed every two years requiring the person be in good standing and have completed continuing education units (CEU). Currently, Soil scientist require 40 hours of continuing education units, EHS require 8 hrs of CEU's, Installers need 8hrs, and Pumpers 6 hrs of CEU's. To assist the Department in the management of 3,200 certified professionals, the DPH Manual establishes a Certification Review Committee (CRC). The CRC determines the certification standards, approves CEU content and providers, and hears complaints which may lead to suspension, revocation or denial of renewal of a certification. (DPH Manual, 2019)

Persons entering the workforce in the form of a soil scientist or regulator, may have degrees in such areas as Biology, Soil Science, Environmental Science, Public Health, or other science based field, but may not have much knowledge of how OSSMS. The DPH provides prerequisite trainings for new EHS hires in County based Health Departments to familiarize these employees with the DPH Manual, site evaluations, system components, and inspecting installations. As can be seen in Figure 1, the number of EHS serving the population is below the minimum number needed by 98 (Kumnick, 2019). The OSSMS industry contractors may attend professional organization training and education through the Georgia On-Site Waste Association (GOWA). GOWA provides CEU trainings for certification and renewals (Lunsford and Hawkins, 2019). In order to help provide training for the new hires and those needing CEU's DPH, GOWA and the University of Georgia Crop and Soil Science Department has partnered to renovate an underutilized existing OSSMS training and demonstration facility in Griffin Georgia on the UGA – Griffin Campus.

### **On-site Waste Treatment System Program**

Developing and continuing to educate a workforce to help with the design, installation, inspection, and management of OSSMS in Georgia falls on the “shoulders” of many different groups. These groups include but are not limited to DPH, GOWA, and the University of Georgia (UGA). The DPH is in the position to educate new employees and provide continuing education to the employees that are reviewing and inspecting the OSSMS. The DPH is also in the position to certify and recertify soil scientist. The GOWA is in the position to provide certification classes and manage the certification requirements for the professionals in the OSSMS industry. DPH and GOWA work with the professionals involved in the OSSMS industry. UGA is a land-grant university whose mission is to provide instruction, research, and extension/outreach to citizens of Georgia. As such, in the role of instruction UGA graduates students in many different fields with some of those students being soil scientist, OSSMS designers, inspectors and installers. In the role of research, work is done to investigate ways to improve OSSMS. And, in the role of extension/outreach, faculty members provide education to homeowners, K-12 students, college students, and home related industries on the all aspects of the OSSMS system. Each agency, organization, or university has a limited ability to reach and provide education to the industry workforce or those outside the industry, but through a partnership education can be provided from the K-12 student to the industry professional.

Providing education to this vast group is being done at the University of Georgia On-site Waste Treatment Training facility located on the UGA-Griffin Campus. The facility was developed in 2005 to provide education to industry professionals and was active until 2008 when the demand for industry training decreased (Lunsford and Hawkins, 2019). Between 2008 and 2018 the facility was intermittently used until UGA and DPH decided to renovate and use it more regularly to meet the increasing need of education for industry professionals (Figure 1). As a result of the renovation, the facility will now be used to educate a wide variety of stakeholders on the different parts of the OSSMS approved for use in Georgia (Lunsford and Hawkins, 2019). When originally developed the site included a displays of distribution boxes, septic tank cross sections, level field, chamber displays, and displays of what different approved distribution systems would look like in a serial configuration. Over the 10 years of limited use, the displays were deteriorated by the elements which required some of them to be replaced.



**Figure 1.** Environmental Health Staffing vs. Population Served, Demonstrates a gap of 98 EHS (Kumnick, 2019)

### Renovation the On-Site Waste Treatment Facility

Renovation of the facility consisted of evaluating what was remaining from the original design of the facility. Once the evaluation had been completed, a redesign of the facility was conducted in a CAD system to provide a layout that could be shared with others. A drawing of the major part of the facility can be seen in Figure 2.

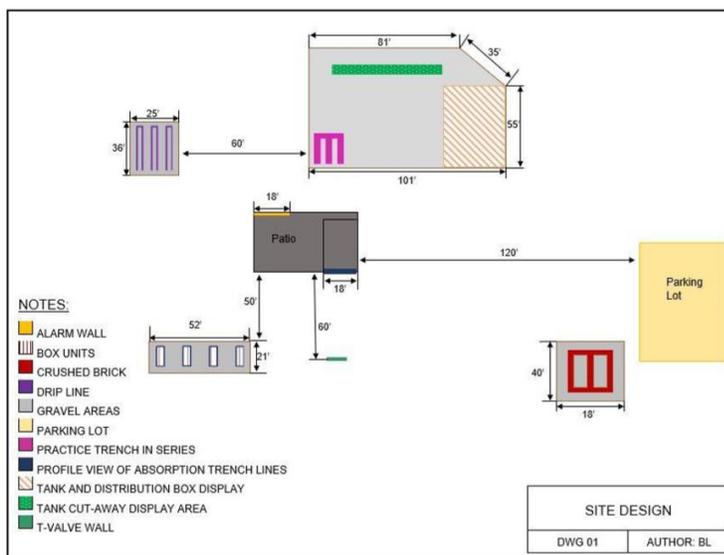


Figure 2. Layout of UGA-Griffin On-site Water Treatment training facility. (Image drawn by Lunsford, 2019)

The second phase of the renovation was to determine which of the original displays could be saved, which needed to be replaced, and which needed to be removed or totally replaced. Images of the original serial trenches can be seen in Figure 3a and the replacement box can be seen in Figure 3b. The facility also had a location where a “level field” display could be set-up with gray gravel was used for the non-trenched area and red brick was used for the trench area (NOTE: the red brick was used since the main soil type of soil in North Georgia is red clay). This can be seen in Figure 4.

The facility also has set of shadowboxes of septic distribution systems approved in Georgia (Figure 5 a,b,c). There is not a shadowbox for each approved distribution system, but the major categories. The boxes are designed to represent a true scale representation of an installed distribution system. The boxes also are designed to have both major types of soil types in Georgia, North and South Georgia. On the front of the boxes is a sheet of plexiglass to allow the instructor to draw on them with dry erase markers and explain different concepts as required by the audience. This lends itself to teaching different levels of persons using the facility.



Figure 3. a) original serial box for individual approved products in Georgia which were deteriorated by the weather and removed, b) newly constructed serial box to be used for all approved products in Georgia. (Photos taken by E. Lunsford and G. Hawkins, 2019)



Figure 4. Level field display area where different approved products in Georgia can be displayed. There are a few components missing from this image that will be added in the final design of the facility. (Photo taken by E. Lunsford, 2019)



Figure 5. a) A sample shadowbox built to demonstrate the pipe and gravel distribution system. The boxes are 36 inches wide to demonstrate a trench and there are two different soils representing a North Georgia soil (Right) and a South Georgia soil (Left); b) Plexiglass covers the boxes to provide a surface to draw on for explaining various concepts of the distribution system; c) the five shadowboxes as they are displayed for educational purposes. (Images by G. Hawkins and J. Rolando Orellana).

Overall renovation of the facility consisted of:

1. Removing any aspects that were built from wood and had rotted over time,
2. Removing all of the old products and replacing them with new ones through work with the manufacturers,
3. Building new demonstration displays and “painting: them with a waterproofing, and
4. Building shadowboxes as a teaching tool

All products on display and demonstration items meet the regulations and approved products in Georgia. The design being used at the UGA on-site waste treatment training facility will incorporate components of other training facilities used by DPH in Georgia, the on-site waste treatment training facility at North Carolina State University, and at Texas A&M University (Jantrania and Munster, 2018).

Additional components to be added to the site as it continues to grow include septic tanks with various deformations that would require them to be rejected for use, approved tank for comparison. All of these tanks will be cut in half to show why they are either approved for use or rejected for use in an OSSMS. An above ground drip irrigation system will be installed as well as other components and products to help educate practitioners of OSSMS in Georgia.

**Future timeline and ideas for the UGA on-site wastewater training facility:**

As the facility is being renovated the purpose is to provide a facility that can be used to develop and educate the Georgia on-site wastewater industry workforce. This will be done through annual (or more as needed) trainings of the new hires at the Georgia Department of Public Health, trainings and certification education events for OSSMS industry professionals, and education of UGA Extension agents, homeowners, and K-12 students. The facility is located on the UGA-Griffin campus and provides the perfect opportunity to educate students earning a degree from the University of Georgia and could fill some of the professional positions at DPH, the industry, or UGA.

In addition to educating the on-site waste industry, the facility also has the potential to be used as an educational venue for many different groups related to or not related to the on-site waste industry. Some of these groups consist of newly hired Department of Public environmentalist, location where on-site waste treatment education can be conducted but also can be a location to host other water related programs. The facility also has the potential of also being a location where UGA professors can conduct research on new products prosed for Georgia or research different ways of managing on-site wastewater.

Educational programming at the facility will be structured to meet the need of the particular group using the facility. It is envisioned that a variety of groups could use the facility. This could include, but is not limited to newly hired DPH environmentalist, UGA Extension Agents, homeowners, realtors, school groups, and surveyors to name a few. As the basic facility will be the same, different curriculums could vary to reflect as follows:

DPH – Use the entire facility to train newly hired employees on all aspects of septic system design to include: digging soils cores to characterize the soil profile, locating a good place for a septic system, designing a system, building a full scale system, and inspecting a system on level as well as sloped land. Included in this would be the ability to assemble different systems approved in Georgia. The facility would also allow for more advanced education as we add additional aspects including more advanced treatment and distribution systems.

University of Georgia Extension (UGA) – County Extension Agents at land grant universities such as UGA work with homeowners on many different topics. Extension agents do not typically get septic system calls, but as educational programs to teach homeowners how to protect septic systems, the facility can be used to provide hands-on education of how systems work, how to protect them, and what could be done to assist homeowners in contacting septic system professionals.

Homeowners – The facility can be used for this group to educate them on how systems are installed, what they look like, what the different components are, how they should

maintain them, and how to protect them from what is flushed to what should or should not be done on and over the drainfield.

School groups – School curriculums cover non-point source pollution and during that section of the curriculum, the facility could be used as a field trip for local schools to teach kids how protecting the septic system will protect water quality.

This facility has clean water present so that water could be run through the distribution systems to show how they would work initially, but there is no intention to use this facility as a demonstration of how wastewater would be used and distributed in the system. Therefore, the facility could display experimental and new technologies, but the facility would not be used to test products.

Maintaining such a system will involve replacing parts of the demonstration items. It is the intention of the authors to finding funding to maintain the system through means of grants, registration fees of events held at the facility, and donations from manufacturing partners. As the facility gets used more and more, other funding avenues will be explored.

### **Conclusion:**

The University of Georgia developed an on-site wastewater treatment facility in 2005 and it was used for 3 years. It was used only intermittently for the following 10 years. In 2018, a renovation of the facility began and is on course to host trainings and fields in 2019 and 2020 and beyond. The facility will be used for the education, certification, and recertification of the OSSMS workforce and professionals, K-12 students, college students, and homeowners so that through education the designers, installers, and inspectors can provide users of OSSMS a good operating system. The facility can also provide education to students and homeowners on the importance of maintaining an on-site waste treatment system to protect the environment

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