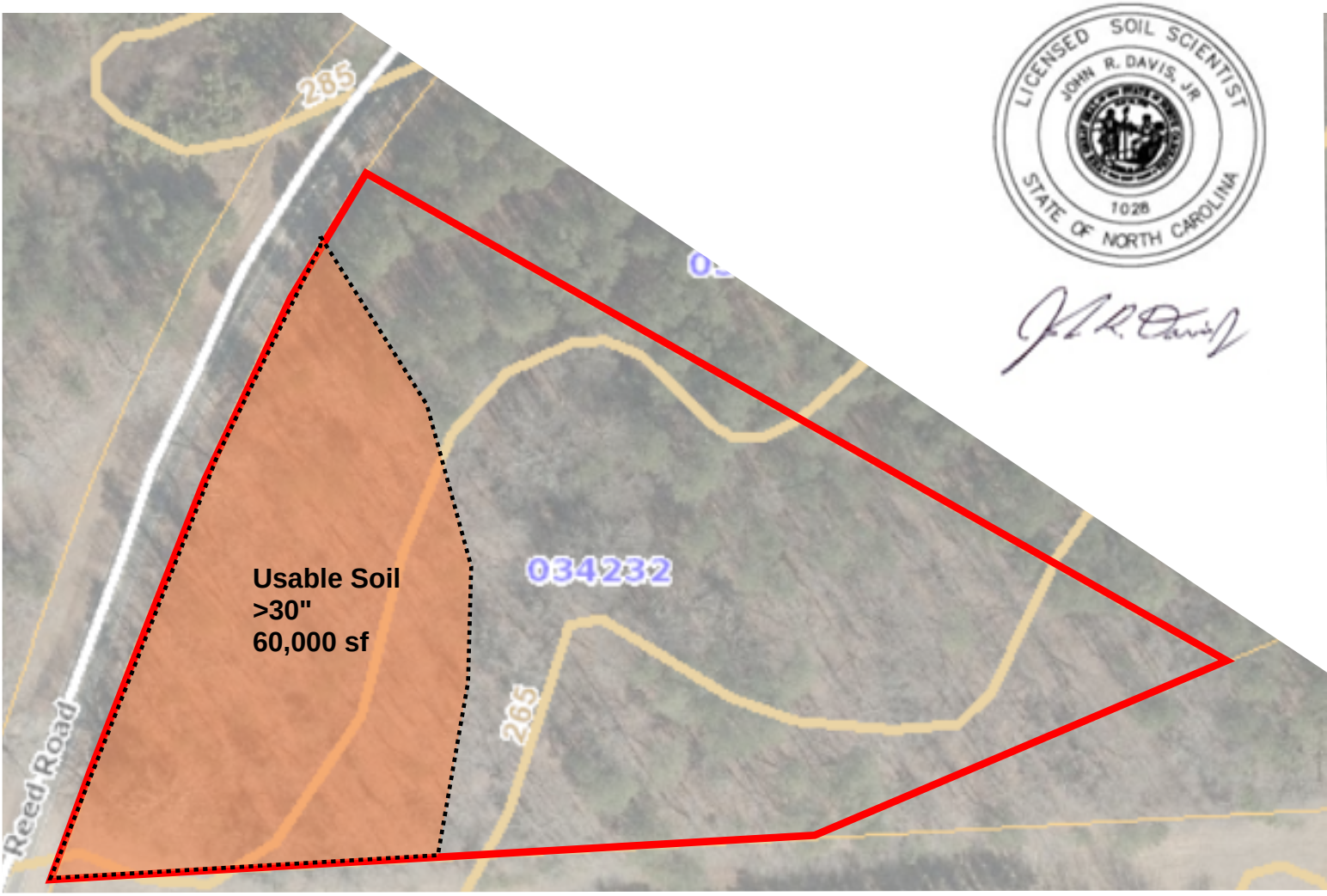
Soil Study for Septic System Suitability
May, 2025
John R. Davis, Jr. LSS
Parcel # 034232
Franklin County, NC

100 ft



LICENSED SOIL SCIENTIST
JOHN R. DAVIS, JR
1028
STATE OF NORTH CAROLINA

The soil area shown in "Orange" is **usable** for gravel or "Accepted" gravelless septic trenches. The soil is sandy loam topsoil over clay subsoil. A four bedroom house septic system generally requires about 10,000 square feet of usable soil for a complete septic system. The soil area shown has over 60,000 square feet of usable soil for a septic system. There may be other areas of usable soil on this property too. You may submit this soil map along with an application for a septic system permit with the local County Health Department as part of the traditional permitting option.

Soil Horizons, LLC

PO Box 1063
Youngsville, North Carolina 27596

Memo

DATE Sept 14, 2022

TO Clients (developers, builders, buyers, sellers, agents, homeowners etc.)

FROM John R. Davis, Jr. LSS, REHS

RE Soil Studies or Assessments for Septic System Suitability (aka. "Perc test")

The purpose of this memo is to inform clients about the nature of the "initial" or "preliminary" soil study conducted on property to determine suitability for septic system(s). The buzz word in this industry is the "perc test" or "perc" which is used quite loosely to mean many different types of tasks related to soils and septic systems. Most often clients desire to know if the soil on a particular property is suitable or will support a septic system for a particular structure most often a single family residence. This bit of knowledge is generally referred to as "perc". Historically, percolation tests were commonly used to assess the soils ability to accept wastewater from a septic tank and that is how the buzz word "perc test" became popular. Because these tests were dependent on the most recent weather such as wet soil in the winter or dry soil in the summer they yielded variable results that were not very dependable. For this reason, they were discontinued in the early 80's and replaced with a more dependable method, the soil evaluation. The soil evaluation consist of taking small hand auger borings down to about three feet below the surface and looking at the soil characteristics in different layers to assess the overall suitability. Without going into too much detail the soil characteristics observed include: soil texture, structure, mineralogy, depth, restrictive horizons, and soil wetness conditions. Since these soil characteristics vary widely, so does the required soil area for given daily wastewater flows.

A determination about a site or properties suitability for a septic system depends on the soil characteristics and the corresponding septic system size required based on those characteristics. Of course, the property has to contain an adequate area of usable soil to accommodate the septic system and an additional repair or replacement septic system for future use if needed. This required area can vary due to the soil characteristics in different geographical areas. Septic systems in sandy, well drained soils of the coastal plain may only require half or a third of the usable soil area of a septic system in clayey piedmont soils. So you can see how the word "perc test" is dependent on several variables. Most preliminary soil studies or assessments are primarily aimed at identifying usable soil characteristics and quantifying the area of usable soil on a site or property. Once this has been completed and found that the property has some usable soil, then the next task is to determine if there is adequate soil area for a given daily design wastewater flow. In North Carolina and other states, daily design flows are assigned or prescribed. For example, residences have a daily design flow of 60 gallons per person or 120 gallons per day, so a three bedroom house will have a prescriptive daily wastewater flow of 360 gallons per day. Septic permits for dwellings are based on the maximum daily flow or number of bedrooms in a dwelling. If the preliminary soil study indicates that the soil on a property does not have suitable soil characteristics then that site or property is classified as **Unsuitable**. In this situation, you could say that the property or area studied does not "perc" and that term would summarize the unfavorable soil characteristics reviewed in the determination. If on the other hand, a large or small area of usable soil was identified by the preliminary soil study, then a more detailed soil study and septic system design may be required to ensure that the soil area will support the proposed prescriptive daily wastewater design flow from the proposed facility.

These additional tasks may be necessary to ensure that the soil on the property will accommodate your proposed house or other facility along with associated improvements such as an on-site water well, drive, parking, out buildings, decks, patios, swimming pools etc. Soil Scientists and regulatory Environmental Health Specialists are the best professionals to conduct the preliminary and detailed soil assessments for septic systems. They have been trained in the science and regulations and have experience to make these judgements. Much subjectivity has been taken out of these soil assessments by referencing very specific objective soil characteristics for a better determination. The soil professionals along with others such as Professional Engineers, Landscape Architects, septic system designers and septic system contractors can best provide the septic system layout and design tasks. This is done to determine if the usable soil area identified will accommodate a particular proposed use. Not all Soil Scientists and Environmental Health Specialists are skilled in the more advanced septic system designs required on difficult properties. These tasks are best conducted by the most experienced individuals such as contractors, engineers, and designers.

The sites with unsuitable soils that cannot be corrected and the sites with an abundance of suitable soils are very straightforward in there classification and are generally **Unsuitable** or **Suitable** for most all common wastewater design flows. These extreme situations can be fairly well described by the term "perc", if you must use that term because they are either absolutely unusable or absolutely usable. It is the marginal sites that have limited soil characteristics and limited available space that cannot be adequately circumscribed by the term "perc" or any other term because so many variables depend or hinge upon one another. Many experienced professionals can design septic systems utilizing one or more techniques to overcome soil and space limitations in an effort to obtain a permit for a particular proposed facility. In these circumstances, substantial time, effort, and costs can be incurred to design a septic system that can change the sites classification from **Unsuitable** (unusable) to **Suitable** (usable) and be

legally permitted. These design tasks may become cost prohibitive on marginal sites and essentially keep a site economically unsuitable. This is where a sites classification becomes fuzzy and gray and is certainly not absolute, so the term "perc" has a deeper meaning and really should **not** be used to describe marginal sites and properties. Because a sites classification is not evident until some investigation has been completed it is probably best to refrain from using the term "perc" at all. This word fits well on a bumper sticker but that is not the place to describe soil suitability because it certainly is not a simple subject.

The value in soil studies or assessments comes in the description of the soil characteristics and quantification of available soil area. This information will greatly aid a regulator in conducting a regulatory assessment and permitting a site, especially if there is an abundance of usable soil area. On larger tracts of land the preliminary soil map will direct the regulator to the best soil area to be reviewed and evaluated. Often times, this is also the most economical soil area for an approved septic system. Soil assessments are critical on marginal sites for the designer, engineer, architect etc. to create the most effective and economical design as possible for the client.

Soil studies that are entirely unsuitable will not require any additional tasks beyond the preliminary soil study and that task is adequate enough to inform to the client, (buyer, seller, builder, developer, etc.) to not pursue development or adjust their offer to purchase accordingly.

If you have any questions about this topic, please give us a call to discuss.
Knowledge is power!

Soil Horizons, LLC **Memo**
PO Box 1063
Youngsville, North Carolina 27596

The scope of soil services provided by John R. Davis, Jr. as a Licensed Soil Scientist since the passage of the Authorized On-site Wastewater Evaluator (AOWE) program (§ 130A-336.2) in the summer of 2022 is now limited to the following services:

Standard Soil Report for Septic System Suitability. This includes preliminary and detailed soil mapping of soils for various types of septic systems. The mapping aspects are limited to the soil depth, area and a suggested loading rate (long term acceptance rate) of the various mapped soil areas on a property. I have conducted these types of studies for over 30 years and many people refer to them as a "Perc Test"! Historically property owners and buyers will request a soil study to find out if the soil is usable or suitable for a septic permit before purchasing or subdividing a property. This information may be used by surveyors or engineers to plan a subdivision as needed or to aid local health department regulators in issuing traditional government septic permits such as the Improvement Permit or Construction Authorization.

Official perc tests were discontinued over 40 years ago but the term "Perc Test" has been used as a catch all phrase for many ***tasks*** done in an effort to obtain a septic system permit. See the information on my web site for more information about the term "Perc Test". These ***tasks*** may be: creating site plans, house siting, well siting, septic system layout and designs etc. These tasks are really not the practice of soil science and may be done by other professionals or regulators such as the local health department Environmental Health Specialists; Authorized On-site Wastewater Evaluators; or Professional Engineers as needed.

With recent legislative changes in North Carolina, you may pursue a septic permit in several ways:

1: Traditional Method where the local health department conducts their own soil evaluation and issues a permit for a particular septic layout and design for a specific facility. They may use my **standard soil report** as a guide to assist them in their efforts. If the local health department requires a septic system layout and design it may be conducted by an AOWE, professional engineer (PE), architect or other professional. As a licensed soil scientist, I am getting away from this task and presently do not conduct designs because this is not in the scope of work of a soil scientist. It needs to be conducted by a person authorized by the State such

as an AOWE, PE or other professional. A designer may use my soil report for a septic system design if authorized as needed.

Under this traditional option the local health department evaluates the soil, issues or denies the permit, inspects the installation and approves and assumes some responsibility and liability for the septic system.

2: LSS Improvement Permit where a licensed soil scientist conducts a soil evaluation for a proposed septic system under G.S. 130A-336 within the scope of the LSS license, then the local health department along with an application for an Improvement Permit in the same manner as the traditional permitting option above shall, within **10** business days of receiving the application, take one of the following actions:

(1) Issue the improvement permit.
(2) Deny the permit application and provide a signed, written report to the applicant citing the applicable rule(s) for permit denial.
(3) Notify the applicant that additional information is needed if the application is incomplete.

If a local health department fails to act on an application for an improvement permit within **10** business days of receipt of a complete application, the local health department **shall issue** the improvement permit. This method helps to expedite the permitting process with local health department approval.

Under this option the licensed soil scientist is responsible for the soil assessment only. The local health department issues the improvement permit for septic system suitability.

Please note that **Improvement Permits** do not allow for the construction of a septic system but are intended to show that the soil is **usable** or adequate for a septic system. This document is generally desired when a client wants to know if the soil is suitable and does not have immediate plans to build a house but just wants some confidence that a septic permit can be issued at a later date. Improvement Permits are good for a period of five years or more. This option requires a more **detailed soil report** than the standard soil report with liability insurance coverage in accordance with the regulations with a higher fee.

*A separate permit known as the **Construction Authorization** will be needed to construct a septic system and this involves a site plan, house layout, drive and well location etc. and can be permitted by the local health department, AOSE or PE. At this time, Soil Horizons does not wish to become approved as an AOSE to design septic systems. These tasks fall more in the scope of engineering and design and are best performed by those professionals.*

3. EOP for Engineered Option Permit. You may also contact a professional engineer to design a septic system without going through the local health department. Under this option, the engineer may use my **detailed soil report** for their design and I can provide that soil report to them as needed upon client request. This option requires a more detailed soil report than the standard soil report with liability insurance coverage in accordance with the regulations with a higher fee.

Under this option, the licensed soil scientist is responsible for the soil assessment only. The professional engineer issues the permit, inspects the installation and approves and assumes some responsibility and liability for the design, siting, installation and operation of the septic system.

4. You may contact an **Authorized On-site Wastewater Evaluator** to conduct their own soil assessment and design and permit the property without going through the traditional permitting option with the local health department. My soil report is not required in this option because the AOWE is a licensed soil scientist and conducts their own soil evaluation and assumes all risks. This option is commonly referred to as an AOWE Option Permit and the law allows the AOWE to site, design, and approve the septic system without holding a professional engineers license. This option is limited to smaller septic systems with flows less than 3,000 gallons per day.

Options 3 and 4 side step the local health department review and approval and the professionals take on the responsibility and liability for the septic system design and permit. These options generally demand higher fees from the professionals too since they are taking on responsibility of the septic system siting, design and operation.

To keep from infringing on the AOWE, PE, or other professionals territory and responsibilities to design and permit septic systems, I **ONLY** conduct soil assessments under my soil science license as has been done for over 30 years. These soil studies can be used for options 1, 2, and 3 described above.

If you need a PE referral for a septic system design, just give me a call for a recommendation. Since the AOWE is such a new program, I do not know the qualifications and reputation of those individuals to recommend for that option.