

## Definitions of the Seasonal High Ground Water Table (SHGWT)

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Patrick A. Barnes, P.G. President  
Barnes, Ferland and Associates, Inc.  
3655 Maguire Blvd. Suite 150  
Orlando, Florida 32803  
Phone: 407-896-8608  
pbarnes@bfaenvironmental.com

Dear Mr. Barnes,

In response to your e-Mail dated 04/20/05, please find the definitions we talked about yesterday afternoon.

- 1) Formal definition of the Seasonal High Water Level (SHWL) from our District's "Basis of Review" (BOR):

**Section 1.7.35 "Seasonal High Water Level" - The elevation to which the ground or surface water can be expected to rise due to a normal wet season.**

A copy of our District's "Basis of Review" can be downloaded from the following URL:

<http://www.swfwmd.state.fl.us/rules/erpmanual.htm>

- 2) Description of *Soil Water* from the Federal Natural Resource Conservation Service (NRCS) – formally known as the Soil Conservation Service:

**Soil water.—Phases are used to distinguish differences in soil-water state, water table level, drainage, and the like where the range of the taxon in one or more of these properties needs to be divided for purposes of the survey. Significant differences in these factors are commonly reflected in differences in soil morphology and are distinguished at the series level. In some soils, however, evidence of wetness, such as redoximorphic features, does not fully reflect the natural drainage or wetness of the soil. These soils may not be differentiated at the series level with the refinement needed for the purposes of the survey.**

**Examples of soil water phases commonly used are: *high water table*, *poorly drained*, *slightly wet*, and *drained*. Some soils have properties that reflect former wetness, but they have been drained artificially; "drained" phases can be used to separate drained areas from undrained. In other soils, a water table fluctuates below the depth where properties are criteria for defining series; "water table" phases can be used to identify such soils.**

The above referenced description was taken from the Chapter 2 of the NRCS's Soil Survey Manual (October 1993). This book is no longer in print, but may be downloaded from the following URL:

The *high water table* discussed in this chapter is what is commonly found in most local NRCS soil surveys (typically under the “soil and water features” table). **During our annual public soils workshops, our District recommends that this NRCS *high water table* be utilized as the “first cut” in estimating SHGWT depths, followed by detailed field investigations to confirm (or adjust) this NRCS estimate.**

- 3) Description of the Seasonal High Saturation (SHS) from Paul Pilny (former NRCS soil scientist – currently retired).

**Seasonal High Saturation (SHS) formerly termed seasonal high water table (SHWT) is characterized by zero or positive pressure in the soil-water, long enough to produce anaerobic conditions.**

**The resulting anaerobiosis promotes biogeochemical processes such as the reduction, translocation, and accumulation of iron and other elements forming redoximorphic indicators.**

Mr. Pilny provided the above referenced definition to our District in a letter dated 01/09/97. We do not know where he obtained this definition. If you wish to pursue the source of Mr. Pilny’s definition, we recommend that you contact Richard D. Ford, NRCS Soil Scientist. Mr. Ford works in the NRCS Bartow field office and his telephone number is 863-533-7121.

- 4) Description of the Seasonal High Water Table (SHWT) from Watts and Hurt (current or former NRCS Soil scientists).

**A seasonal high water table (SHWT) is the shallowest depth to free water that stands in an unlined borehole or where the soil moisture tension is zero for a significant period (more than a few weeks) - Watts and Hurt, 1991.**

The above referenced definition was incorporated into a paper published in April, 1993 by Devo Seereeram, Ph.D., P.E. entitled “*Estimating the Normal Seasonal High Groundwater Table: A Mix of art & Science*”. This paper by Dr. Seereeram is contained in our (SWFWMD) CD-ROM that we distribute during our annual public workshops on estimating SHGWT depths. As discussed, I will be sending you a copy of this CD later today via U.S. mail.

- 5) *Water Table Fluctuation in Representative Immokalee and Zolfo Soils of Florida* by Adam G. Hyde and Richard D. Ford (current or former NRCS Soil scientists).

This is an excellent paper detailing the fluctuation of the SHGWT in Florida Pine Flatwoods soils from 1977 to 1986. It is also included in the CD-ROM that I will be sending you later today.

As discussed yesterday afternoon, I am not aware of any definition for “*normal ground water table*” or “*seasonal low ground water table*”. To my knowledge, there are no soil, chemical or biological indicators in the soil profile that could support these “definitions”.

This paper by Hyde & Ford is the only resource I am aware of that could be used to guess these conditions in Florida Pine Flatwoods soils. **My personal opinion / recommendation - it is unwise to attempt to estimate “normal” or “seasonal low” ground water table depths.**

- 6) Layman’s definition of the Seasonal High Ground Water Table (SHGWT) by Hank Higginbotham, P.E.

**The Seasonal High Ground Water Table (SHGWT) is a zone of:**

- **water saturated soil**
- **at the highest average depth**
- **during the wettest season of the year**

**SHGWT is NOT “free standing” water that you find in your auger boring during the “dry” season (a common error by many P.E.s).**

As discussed yesterday afternoon, I utilize this “definition” in our annual soils workshops, as the overwhelming majority of our students are not soil scientists. For the purposes of our training, we have found that this definition works best for the intended purpose of our lectures - *to educate our students on the importance of SHGWT and down gradient “tailwater” effects on storm water management system designs and subsequent permit applications to our District.* In addition, we provide the following information to our students:

**Factors that aid in the determination of the Seasonal High Ground Water Table (SHGWT):**

- **Natural vegetation (overstory & understory)**
- **Soil colors**
- **Soil Mottles - an indicator of anaerobic (water saturated) conditions**
- **Depth to the root zone - free standing water is the greatest impediment to root growth.**
- **Depth to the clay layer (hardpan)**
- **Man – made indicators: elevated septic tank drain fields, raised building pads, etc.**

**All of the above indicators may not be present in the soil you are investigating. For instance, soil mottles are generally absent in Pine Flatwoods landscapes (spodosols), and the natural vegetation may have been cleared years ago for a cow pasture or other agricultural uses.**

The above information is also included in the CD-ROM that I will be sending you later today.

**Closing Remarks:**

As discussed yesterday afternoon, the estimation of SHGWT depths is NOT generally taught as part of most collegiate engineering programs (geotechnical or civil engineering). The only Florida Universities (that I am aware of) that provide detailed training on determining SHGWT depths are the Soil Science Departments – College of Agriculture at the University of Florida (Gainesville) and Florida A&M University (Tallahassee). If you desire to pursue additional definitions of the SHGWT, I recommend that you contact these university departments.

In the meantime, please call me in Tampa should you have any additional questions.

Thanks,

Hank Higginbotham, P.E.  
Technical Services Department, Resource Regulation  
Southwest Florida Water Management District (SWFWMD)  
7601 Highway 301 North  
Tampa, Florida 33637-6759  
800-863-0791, x2001 (Florida Only)  
863-985-7481, x2001  
SunCom 578-2001  
[hank.higginbotham@swfwmd.state.fl.us](mailto:hank.higginbotham@swfwmd.state.fl.us)

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