

M E M O R A N D U M

DATE: May 18, 2009

FOR: Elke Ursin, Florida Department of Health

FROM: Damann L. Anderson, P.E.

SUBJECT: Evaluation of Test Facility Site

Hazen and Sawyer is conducting the Florida Onsite Sewage Nitrogen Reduction Strategies (FOSNRS) Study under contract CORCL with the Florida Department of Health. Under Task A of this project, we are in the process of identifying test facility sites where multiple assessments of onsite nitrogen reduction technologies and groundwater quality can be conducted in subsequent phases of the study. Two potential sites identified in the response to the ITN were the University of South Florida Lysimeter Facility property and the University of Florida's Gulf Coast Research and Education Center (GCREC) near Wimauma, FL. Salient issues include space availability, site access, wastewater source of sufficient quantity and quality, subsurface hydrology, power supply and security.

After a preliminary assessment of the USF Lysimeter Facility, we feel that the cost of rehabilitating this facility will be beyond the budget allocated for that effort. Also, since space is limited at the USF facility and it is not conducive for groundwater quality assessments, we have concluded that it would be more cost effective to have only one test facility, where the controlled testing portion of the project could be conducted. It is our recommendation that the GCREC be selected as the test facility site. This memorandum summarizes the characteristics of the GCREC facility, as related to establishment of this test facility.

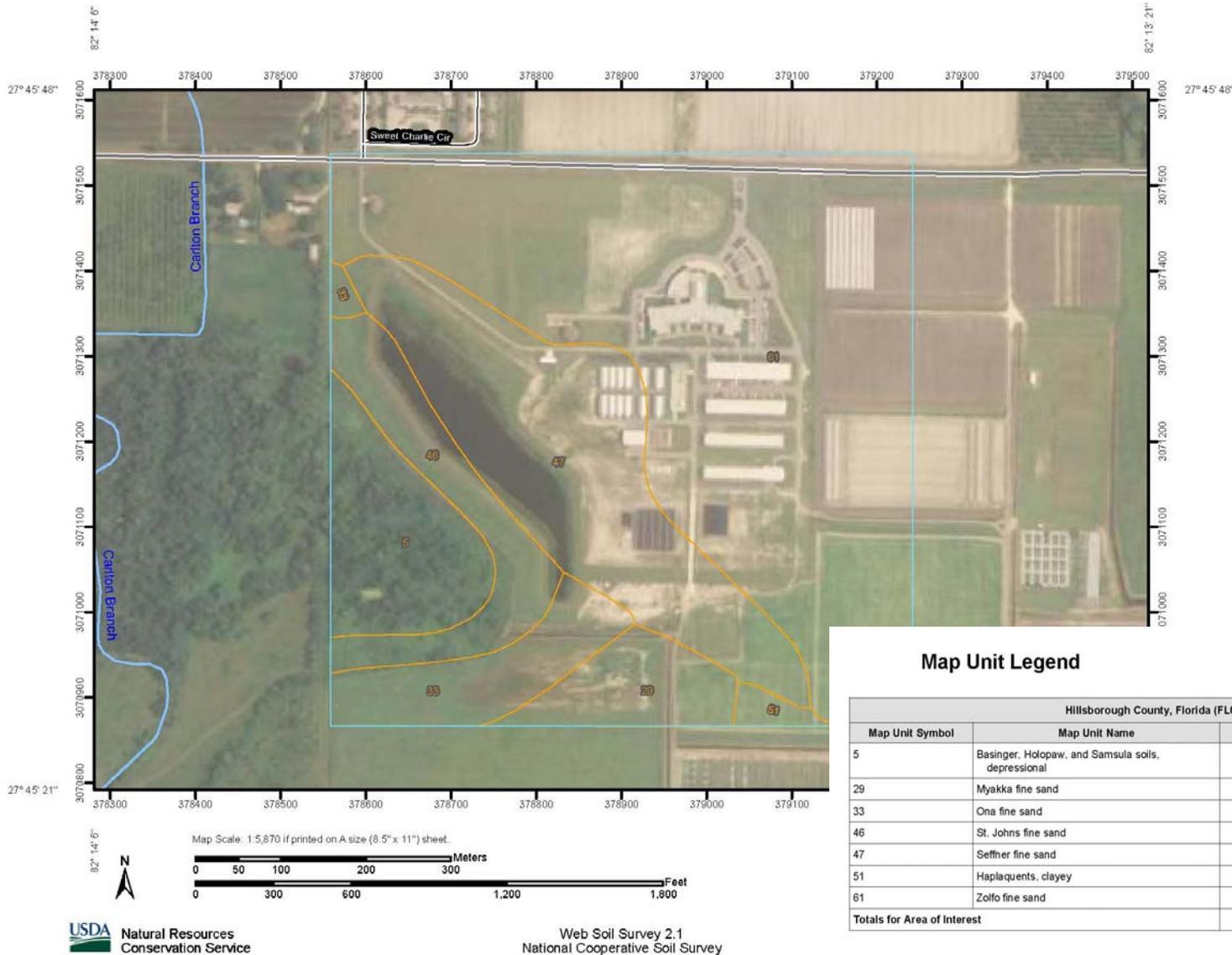
The GCREC facility is located at 14625 County Road 672, Wimauma, Florida. The facility is situated on 475 acres of land that were donated by Hillsborough County government. The facility contains research trials for vegetables, small fruit and ornamental plants. In addition, 16 laboratories are housed onsite, one being a water quality laboratory which is available and can provide many of the analyses of interest for the FOSNRS project. One of the active programmatic areas is soil and water science. A preliminary agreement to participate has been obtained, and the key personnel at the facility are interested in the FOSNRS study. A suitable area for the proposed work has been identified at the facility as depicted in Figure 1.



Figure 1. GCREC Facility and Proposed Project Area

Figure 2 is the web soil survey for the project area produced by the National Cooperative Soil Survey operated by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). As shown, the primary classification of soils on the site are Zolfo and Seffner fine sands.

Soil Map—Hillsborough County, Florida



Map Unit Legend

Hillsborough County, Florida (FL057)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Basinger, Holopaw, and Samsula soils, depressional	9.4	8.2%
29	Myakka fine sand	5.1	4.5%
33	Ona fine sand	7.1	6.3%
46	St. Johns fine sand	8.5	7.5%
47	Seffner fine sand	22.6	19.9%
51	Haplaquents, clayey	0.9	0.8%
61	Zolfo fine sand	59.9	52.8%
Totals for Area of Interest		113.4	100.0%

Richard Ford, a Resource Soil Scientist with the NRCS, conducted a preliminary soils assessment of the GCREC project area on March 26, 2009. The objective of the soils assessment was to confirm the soil characteristics on the site, obtain soil profile descriptions and morphology, and obtain an estimate of the depth to seasonal high water table at the site. The mapped soils in this area are primarily Seffner fine sand (47) and Zolfo fine sand (61), with a limited area of Myakka fine sand (29). These are soils of the Florida flatwoods land resource area. Seffner and Zolfo fine sands are classified as somewhat poorly drained and Myakka fine sand is classified as poorly drained. A letter from Mr. Ford describing his assessment is included with this memo as an attachment.

Figure 3 indicates the approximate locations where five soil borings were augered on site to a depth of eighty inches.

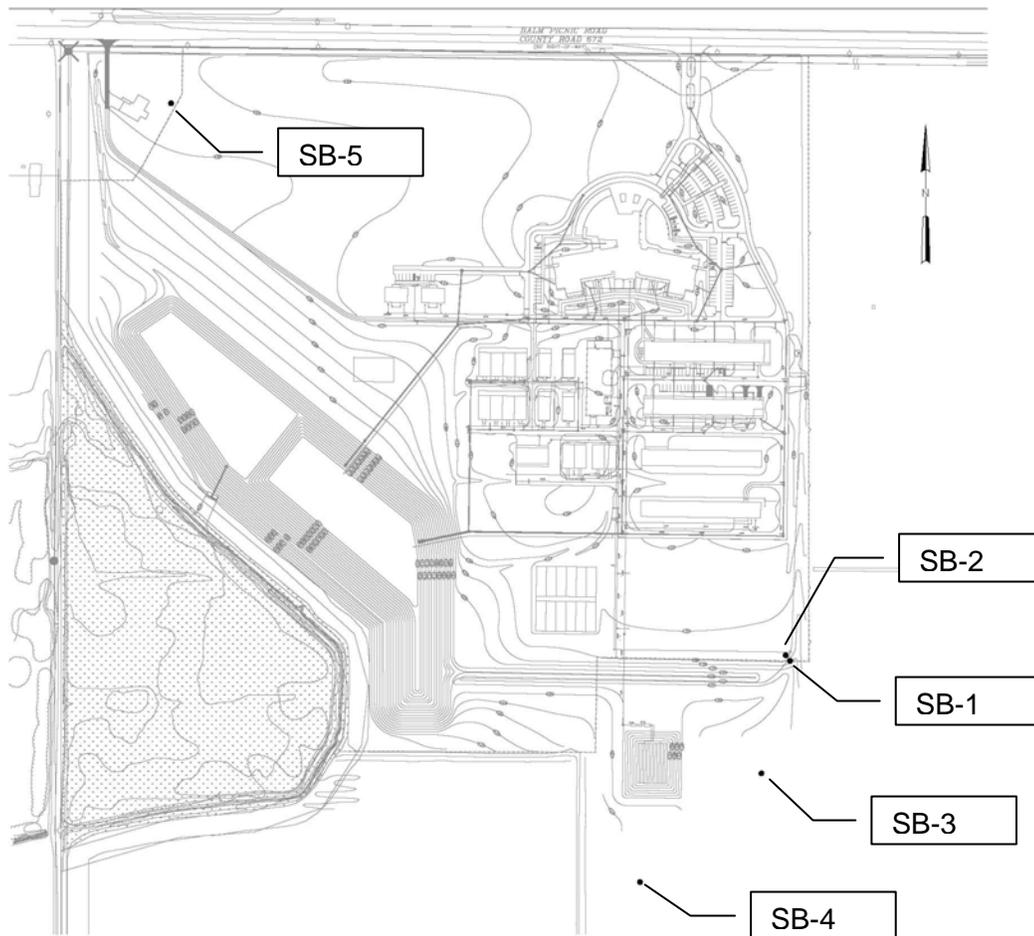


Figure 3. Approximate Soil Boring Locations

Soil boring 1 was identified as Zolfo fine sand. This profile had a well developed spodic horizon at about 58 inches. There was also evidence of some sand fill noted at the surface. It was estimated at approximately 10 inches thick. The soil profile at SB-2 was also identified as Zolfo fine sand. The well developed spodic horizon was at approximately 54 inches. There was about 10 inches of fill on the surface. The seasonal high water table was determined to be 30 inches plus or minus 6 inches. Soil boring 3 was mapped and identified in the field as Zolfo fine sand. The seasonal high water table indicators were found between 24 and 39 inches. The location of SB-4 is in or near an area mapped as Myakka fine sand based on the Soil Survey of Hillsborough County, Florida. However, the soil identified on site more closely resembled Seffner fine sand. This soil differs from Myakka fine sand by being somewhat poorly drained rather than poorly drained. The seasonal high water table was determined to be 30 inches plus or minus 6 inches. Soil boring 5 was identified as Zolfo fine sand. The seasonal high water table was also determined to be 30 inches plus or minus 6 inches. Seffner and Zolfo fine sands are both deep, somewhat poorly drained soils formed in sandy marine sediment. They are found on low-lying ridges on the flatwoods.

Based on the soils found on site, the soil mapping is representative. Water table depths determined on site were within the range of the mapped soils with only one exception. This occurred at soil boring 4 where Seffner fine sand was identified rather than Myakka fine sand. In addition, the area identified as Haplaquents in the Soil Survey of Hillsborough County was not encountered in the area investigated. If present, this area must exist south of the drainage ditch that forms the southern boundary of the study area, which was not investigated.

Another salient issue regarding the project site is a wastewater source of sufficient quantity and representative quality. The existing onsite wastewater treatment system consists of a pressure dosed mound system designed for 2,850 gallons per day. The septic tank receives flow from the research facility offices and approximately 11 graduate students that live in onsite dormitories. The laboratory liquid waste flow is not sent to the onsite wastewater system. Table 1 provides a summary of the system based on design drawings located at the GCREC.

Table 1. GCREC Onsite Wastewater Treatment System Summary

Primary Treatment – two precast septic tanks in series	-One 2,500 gallon precast septic tank- Category 4 without baffle -One 1,250 gallon precast septic tank- Category 4 with outlet screen
Dosing Tank	3,000 gallon precast pump/dosing tank- Category 4
Mound System Drainfield	4,351 ft2 infiltrative area (0.65 gpd/ft2)

A grab sample was collected at the outlet of the second septic tank on March 26, 2009. Results of laboratory analyses of this sample are summarized in Table 2.

Table 2. Septic Tank Effluent Field & Laboratory Analyses

pH (measured in field)	6.51
Temperature (°C, in field)	25.4
Dissolved Oxygen (mg/L, in field)	0.13
Alkalinity (mg/L)	220
TKN (mg/L)	52
Ammonia (mg/L)	39
Nitrate (mg/L)	0.24
Nitrite (mg/L)	0.022
CBOD ₅ (mg/L)	300
COD (mg/L)	680
Fecal Coliform (Col/100 mL)	10E6
Phosphorus (Total) (mg/L)	8.5
Total Dissolved Solids (mg/L)	590
Total Suspended Solids (mg/L)	80

Six piezometers were installed at the facility on March 17, 2009 to determine subsurface hydrology. Figure 3 depicts the approximate piezometer locations and the water table elevations measured on March 26, 2009.

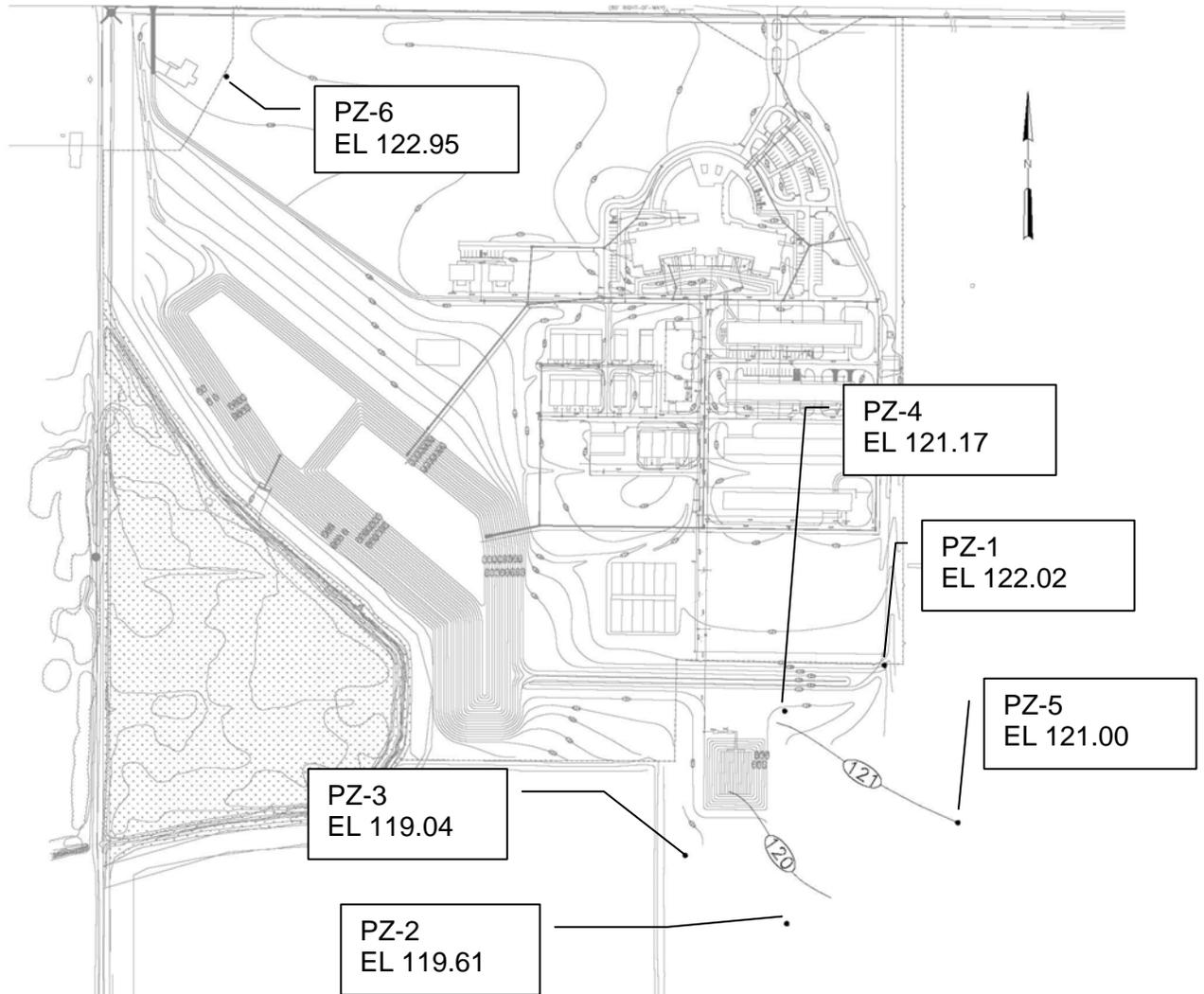


Figure 3. Piezometer Locations and Water Table Elevations on March 26, 2009

Summary

Based on the cost and time associated with rehabilitating the USF facility, it has become apparent that proceeding with construction of two test facility sites will be costly and time consuming. The current budget in the FOSNRS contract for construction of a test facility at USF does not appear to be sufficient for both the rehabilitation work and the testing facility construction. In addition, the USF Lysimeter station can only be used for pilot tests of treatment technologies and unsaturated zone work, since the water table is extremely deep at the site (>25 ft.) and sufficient area for plume delineation and monitoring is not available. Management of two facilities once operational will also be more difficult and expensive in future phases of the project.

The preliminary soils assessment, wastewater (STE) quality, and preliminary GW assessment appear to be conducive to performing the proposed work. While the flatwoods type soils at the site have a shallow groundwater that may be more likely to support *in-situ* denitrification, the soils of the Florida flatwoods land resource area make up approximately 55% of the area of the state, over 60% if the Everglades land resource area is excluded. In contrast, soils of the central Florida ridge land resource area make up approximately 17% of the area of the state (Ayres Associates, 1987). Also, a site conducive to *in-situ* denitrification is desirable from a groundwater modeling perspective. To include denitrification in the models developed in Task D, a study site where denitrification can be measured will be more likely to provide the needed inputs and calibration data for model development. If the mechanisms of *in-situ* denitrification can be identified at the site, then the models developed should be able to predict whether such denitrification is likely to occur at any given site. Additionally, the individual home field sites for Task C will be chosen to include soils of different types, including well drained fine sands typical of the central Florida ridge recharge areas, and the models developed will be tested at these sites.

Treatment technology pilot testing and both the saturated & unsaturated zone investigations could be performed at the GCREC. Therefore, the Project Team recommendation is to conduct all test facility work at the GCREC. This recommendation would include shifting the funds for test facility design and construction in Task A to the design and construction of the test facility for Task C, or vice versa. We would like to proceed with the GCREC site as the only FOSNRS Study testing facility, and request FDOH direction in this regard.

enc: NRCS letter

c: E. Roeder
P. Booher

File 44237-001



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April 14, 2009

Hazen and Sawyer, P.C.
10002 Princess Palm Ave.
Suite 200
Tampa, Florida 33619

ATTN: Mr. Anderson
RE: Onsite Wastewater Treatment research

Dear Sir:

An on site soil investigation was conducted March 26, 2009 at the UF Gulf Coast Research and Education Center to determine the seasonal high water table and ascertain whether or not the soils were mapped correctly in the most recent NRCS soil survey documentation for Hillsborough County. The area of concern is located in section 29, T31S, R21E; Hillsborough County, Florida.

Soil borings were made at preselected sites or points to a depth of eighty inches. The mapping units were identified and the seasonal high water table determined. The Soil Survey of Hillsborough County, Florida and the Web based Soil Survey of Hillsborough County were used in this effort.

Five soil borings were made on site to a depth of eighty inches in the area of concern. The mapped soils in this area are Seffner fine sand (47), Zolfo fine sand (61), and Myakka fine sand. These soils are classified as poorly to somewhat poorly drained.

SB#1 was located five feet NW of PZ#1 and was identified as Zolfo fine sand. This profile had a well developed spodic at about 58 inches. There was also evidence of some sand fill noted at the surface. It was estimated at about 10 inches thick.

SB#2 was located 23 feet NW of PZ#1. This profile was identified as Zolfo fine sand. The well developed spodic was at 54 inches. There was about 10 inches of fill on the surface. The seasonal high water table was determined to be 30 inches plus or minus 6 inches.

SB#3 was located 200 feet east of the mound system's eastern edge. The soil mapped on site and identified in the field was Zolfo fine sand. The seasonal high water table indicators were found between 24 and 39 inches.

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SB#4 was located 95 feet east of the field road edge and 95 feet north of the line of trees. This area is mapped Myakka fine sand based on the Soil Survey of Hillsborough County, Florida. The soil identified on site was Seffner fine sand. This soil differs from Myakka fine sand by being somewhat poorly drained rather than poorly drained. The seasonal high was determined to be 30 inches plus or minus 6 inches.

SB#5 was located on the east side of the Farm Manager residence inside the chain link fence. Zolfo fine sand was identified on site. The seasonal high was determined to be 30 inches plus or minus 6 inches.

Based on the soils found on site the soil mapping is representative. Water table depths determined on site were within the range of the mapped soils with only one exception. This occurred at SB#4 where Seffner fine sand was identified not Myakka fine sand.

In addition, the area identified as Haplaquents in the Soil Survey of Hillsborough County was not encountered in the area investigated. If present, this area must exist south of the drainage ditch that forms the southern boundary of the study area, which was not investigated.

Please call if you have any questions. Thank you very much.

Yours truly,

Richard D. Ford
Resource Soil Scientist
cc: Juan Vega, District Conservationist

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