



Soil & Environmental Consultants, PA

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June 15, 2017

S&EC Project # 13114.S2

NC Parks & Recreation
Attn: Mr. Daron Blount, Project Manager
1615 Mail Service
Raleigh, NC 27699-1600

Re: Soil Evaluation on Raven Rock State Park Property, Approximately 5.5 Acres, Harnett Co., NC

Dear Mr. Blount:

Soil & Environmental Consultants, PA (S&EC) performed a preliminary soil and site evaluation on the above referenced property. This was performed at your request as part of the preliminary planning process in order to determine areas of soil that have potential for subsurface wastewater disposal. Fieldwork was performed on June 13, 2017 and completed as per our proposal dated May 23, 2017.

S&EC traversed the target area of the property and observed landforms (slope, drainage patterns, past use, etc.) as well as soil conditions (depth, texture, structure, seasonal wetness, restrictive horizons, etc.) through the use of hand auger borings. The site was evaluated during moist soil conditions. From these observations, a limited evaluation of the site, relative to subsurface disposal of wastewater, was developed. Soil areas were estimated in the field. The soil/site evaluation criteria used is that contained in 15 A NCAC 18A .1900 "Laws and Rules for Sewage Treatment and Disposal Systems".

FINDINGS

This site is located in the upper coastal plain/acid crystalline piedmont contact region of Harnett County. The upland soils on this tract are similar to the Lillington soil series. The Lillington soil series has a thick brown to yellowish brown gravelly sandy loam to loam material over a gravelly red sandy clay loam to clay subsoil. The lower subsoil maybe classified as saprolite and will have to be evaluated with the backhoe to determine if the soil structure is suitable. The site is extremely gravelly and may require backhoe pits during the evaluation by the permitting agency.

The accompanying sketch map indicates the estimated area with potential use for subsurface wastewater disposal. The crossed hatched units indicate areas of soils which are at least 24 to 36+ inches deep to prohibitive soil characteristics and these areas may have potential for a conventional, a modified conventional system (shallow placed lines with no fill required over the disposal area), a low pressure pipe system (LPP) and/or a subsurface drip irrigation system. Unit "UN" on the attached map indicates areas that have unsuitable landscape position (gullies, drainageways, etc.) and are generally unsuitable for the type of systems mentioned above. The target area was identified to S&EC by the engineer and areas identified as "NE" on the attached sketch map were not evaluated because they were outside of the target area.

The site plan for this project must ensure that adequate soil area for system and repair is unaffected by site elements (building placement, roads, wells, etc.) on this area. The area ultimately designated by the health department and/or State on the site plan for the septic system and repair must remain undisturbed (no mechanical clearing, excavation, heavy traffic or other significant site disturbing

activities) until authorized by the health department. An area with initially adequate useable soil area may be rendered unusable as a result of improper site planning and/or disturbance. A field layout of the proposed septic system may be required as part of the permitting process. As we discussed through correspondence prior to the initial site evaluation, additional fieldwork may be needed prior to final site approval for this project depending on the wastewater flow from the proposed facility.

It is important to note that any preliminary certification for a site plan does not represent approval or a permit for any site work, nor does it guarantee issuance of an improvement permit for any project. Final site plan approval for issuance of improvements is based on regulations in force at the time of permitting and is dependent on satisfactory completion of individual site evaluations following application for an improvement permit detailing a specific use and siting.

GENERAL WASTEWATER CONSIDERATIONS

Once potentially useable areas are located through vertical borings, the next consideration is the horizontal extent of those areas. The size and configuration of the useable soil area dictate the utility of that area. The size of a subsurface disposal field is determined by: 1) the design flow from the source, and 2) the long term acceptance rate (LTAR) of the soil (based on the hydraulic conductivity of the soil, a function of the soil's texture, mineralogy, structure, porosity, etc.). The configuration must be such that an efficient layout of disposal lines (on contour) is possible. An additional consideration is the required setbacks for the system from various elements such as wells (100'), streams and ponds (50') or more (depending on watershed regulations), property lines (25'), top of embankment (15'), watershed buffers, etc. (see Attachment 1).

The utility of a potential useable soil area for a subsurface system is most accurately determined by an on-ground layout of the proposed system after the final LTAR is determined, as described above. The total area needed that may be needed for a system and repair will depend upon the system type, the layout of that system and the total design flow (factors mentioned above). Per our correspondence, the system flow is estimated at 2,900 gallons per day. A typical amount of drain line needed for a 2,900 gallon per day system is approximately 4,145 to 4,834 linear feet of conventional/modified conventional line (system and repair) or 11,600 linear feet of LPP line (system and repair). These assume the system is not permitted with a flow equalization tank and the estimates reference Laws and Rules for Sewage Treatment and Disposal Systems for North Carolina and use a LTAR of 0.3 to 0.35 gpd/ft² for conventional and modified conventional septic systems (.1956) and a 0.10 gpd/ft² for LPP septic systems (.1957a). The ultimate LTAR will be determined by the health department and/or state agency after their site evaluation. S&EC will be glad to assist in any system layout, hydrogeological assessment, or sizing calculations if requested.

This report discusses the general location of potentially useable soils for on-site subsurface wastewater disposal and, of course, does not constitute or imply any approval or permit as needed by the client from the local health department and/or state permitting agency. S&EC is a professional consulting firm that specializes in the delineation of soil areas for wastewater disposal and the layout and design of wastewater treatment systems. As a professional consulting firm, S&EC is hired for its professional opinion in these matters. The rules governing wastewater treatment (interpreted and governed by local and state agencies) are evolving constantly and, in many cases, affected by the opinions of individuals employed by these governing agencies. Because of this, S&EC cannot guarantee that areas delineated and/or systems designed will be permitted by the governing agencies. As always, S&EC recommends that anyone making financial commitments on a tract be fully aware of individual permit requirements on that tract prior to final action.

This report and site evaluation is not conformant to the Engineered Option Permit (EOP) process. Additional site testing and evaluations will be required to utilize the EOP process. The soil report and map associated with this project is for the exclusive use of the addressee and the use or reliance by all others is expressly denied without the written consent of S&EC.

A septic system permit will be required prior to obtaining a building permit for this project. This will involve a detailed evaluation by the local health department and/or the State DEH On-Site Waste water Section, to determine, among other things, system size and layout. The site is extremely gravelly and may require backhoe pits during the evaluation by the permitting agency.

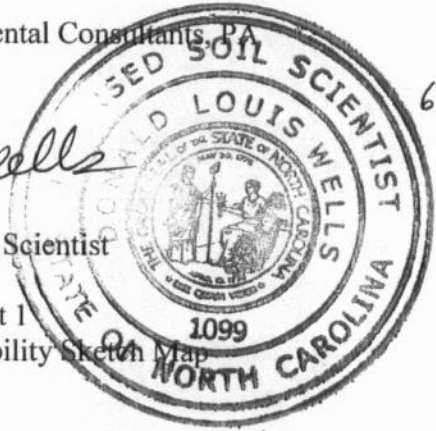
Soil & Environmental Consultants, PA is pleased to be of service in this matter and we look forward to assisting in any site analysis needs you may have in the future. Please feel free to call with any questions or comments.

Sincerely,
Soil & Environmental Consultants, PA

Don Wells

Don Wells
NC Licensed Soil Scientist

Encl: Attachment 1
Soil Suitability Sketch Map



6-15-17

Cory Connell
Cory Connell
Soil Scientist in Training

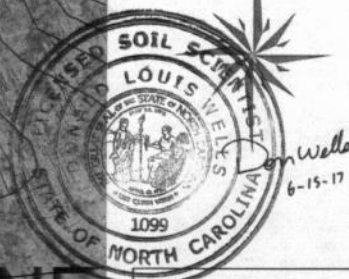
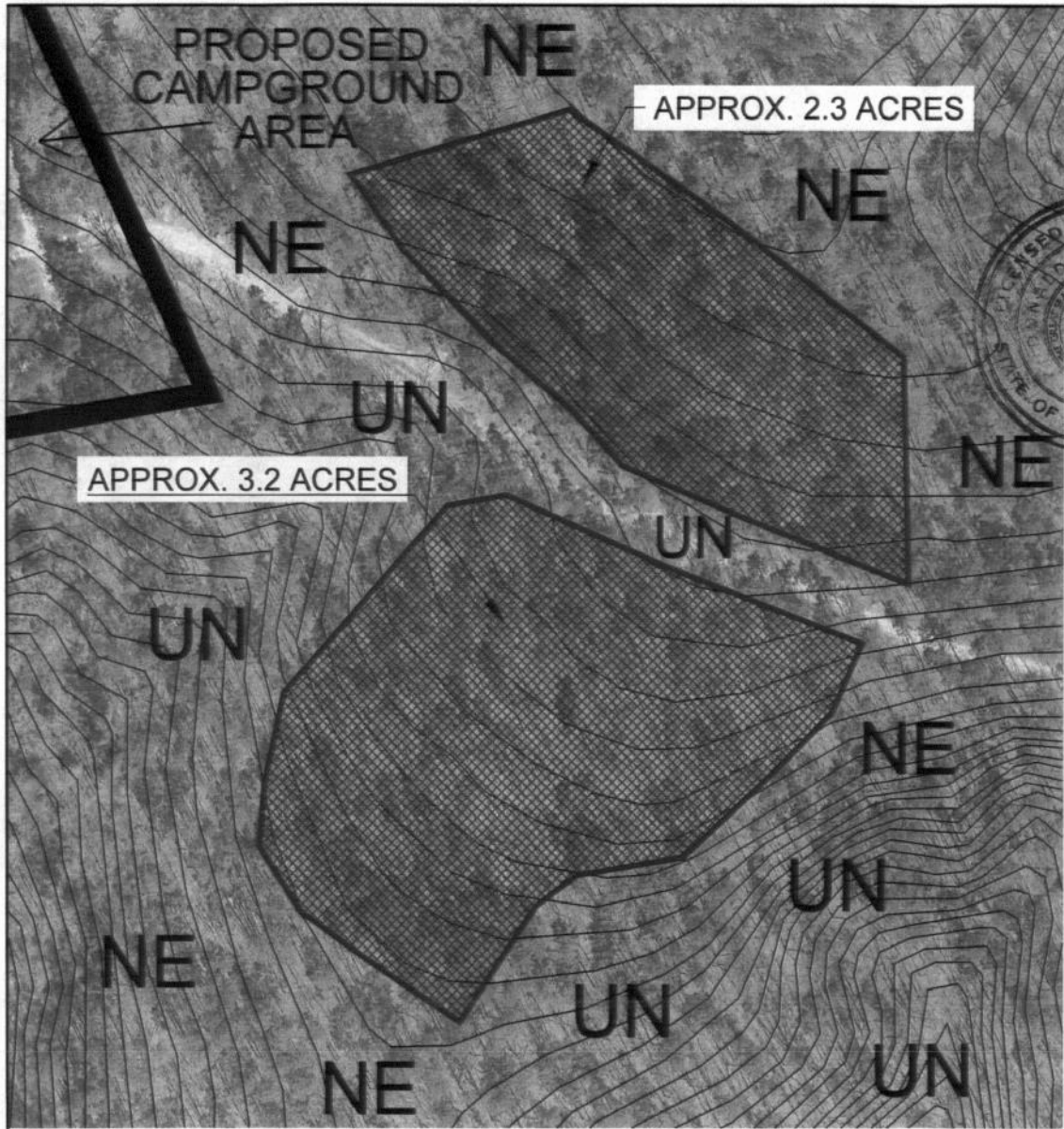
Attachment 1

.1950 Location of Sanitary Sewage Systems

(c) Every sanitary sewage treatment and disposal system shall be located at least the minimum horizontal distance from the following:

- | | |
|--|-------------------------------------|
| (1) any private water supply source including a well or spring | 100 feet |
| (2) any public water supply source | 100 feet |
| (3) streams classified as WS-I | 100 feet |
| (4) water classified as S.A. | 100 feet from mean high water mark |
| (5) Other coastal waters | 50 feet from mean high water mark |
| (6) any other stream, canal, marsh, or other surface waters | 50 feet |
| (7) any Class I or Class II reservoir | 100 feet from normal pool elevation |
| (8) any permanent storm water retention pond | 50 feet from flood pool elevation |
| (9) any other lake or pond | 50 feet from normal pool elevation |
| (10) any building foundation | 5 feet |
| (11) any basement | 15 feet |
| (12) any property line | 10 feet |
| (13) top of slope of embankments or cuts of 2 feet or more vertical height | 15 feet |
| (14) any water line | 10 feet |
| (15) drainage systems: | |
| (A) Interceptor drains, foundation drains and storm water diversions | |
| (i) upslope | 10 feet |
| (ii) sideslope | 15 feet |
| (iii) downslope | 25 feet |
| (B) Groundwater lowering ditched and devices | 25 feet |
| (16) any swimming pool | 15 feet |
| (17) any other nitrification field (except repair area) | 20 feet |
| (b) Ground absorption, sewage treatment and disposal systems may be located closer than 100 feet from a private well supply, except springs and uncased wells located downslope and used as a source of drinking water, repairs, space limitations and other site-planning considerations but shall be located the maximum feasible distance and, in no case, less than 50 feet. | |
| (c) Nitrification fields and repair areas shall not be located under paved areas or areas subject to vehicular traffic. If effluent is to be conveyed under areas subject to vehicular traffic, ductile iron or its equivalent pipe shall be used. However, pipe specified in Rule .1955 (e) may be used if a minimum of 30 inches of compacted cover is provided over the pipe. | |

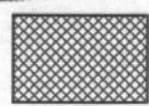
Note: Systems over 3000 GPD or an individual nitrification fields with a capacity of 1500 GPD or more have more restrictive setback requirements, see .1950 (a) (17) (d) for specifics.



PRELIMINARY SOIL/SITE EVALUATION.
 SOIL LINES WERE DELINEATED IN THE FIELD BY S&EC PERSONNEL. THE SOIL LINES WERE SKETCHED ONTO THE MAP BASED ON TOPOGRAPHY, HANDHELD GPS POINTS, AND OTHER SITE FEATURES. SUITABLE SOIL BORING LOCATIONS ARE MARKED IN THE FIELD WITH BLUE AND WHITE STRIPED FLAGGING.

****NOTE:** THIS AREA IS EXTREMELY ROCKY. BACKHOE PITS MAY BE REQUIRED DURING THE SITE EVALUATION WITH THE COUNTY HEALTH DEPARTMENT AND/OR NCDEQ.

LEGEND



Areas contain soils with 24 to 36 inches or more of useable material and have the potential for conventional, modified conventional, ultra-shallow conventional, and/or low pressure pipe septic systems. Total acres =5.5.

UN
NE

Unsuitable areas due to soil wetness condition, soil depth, clay mineralogy, and/or landscape position.
 Areas that were not evaluated

****THIS MAP AND CORRESPONDING SITE EVALUATION IS NOT CONFORMANT TO THE ENGINEERED OPTION PERMIT (EOP) PROCESS. ADDITIONAL SITE TESTING AND EVALUATIONS WILL BE REQUIRED TO UTILIZE THE EOP PROCESS.**

****SUITABLE FOR PRELIMINARY PLANNING PURPOSES ONLY. SITE WILL REQUIRE APPROVAL BY THE COUNTY HEALTH DEPARTMENT AND/OR NCDEQ ON A CASE BY CASE BASIS. THIS MAP SHOULD BE USED AS A GENERAL GUIDE. SOME ADJUSTMENTS WILL BE NECESSARY IN THE FIELD DUE TO SOIL VARIABILITY AND TOPOGRAPHIC IRREGULARITIES. THIS MAP ONLY REFLECTS EXISTING SOIL SUITABILITY FOR ON-SITE SEPTIC TANK SYSTEMS. SOME OTHER CONSIDERATIONS THAT AFFECT SITE SUITABILITY THAT SHOULD BE CONSIDERED IN DEVELOPMENT DESIGN ARE:**

- 1) 10' SETBACK FROM PROPERTY LINE
- 2) 100' SETBACK FROM ANY WELL
- 3) 25' SETBACK FROM DRAINAGE DITCHES.

SEE ACCOMPANYING S&EC REPORT.



GRAPHIC SCALE
 1" = 100'

NOT A SURVEY.
 2-FOOT CONTOURS FROM NCDOT GIS. 2013 AERIAL FROM NCONEMAP.COM. PROPOSED CAMPGROUND BOUNDARY PROVIDED BY THE ENGINEER.

Project No.: 13114.52	Drawn: CC	Sheet No.: 1 of 1
Project Manager: DW	Field Work: CC	
Scale: 1" = 100'		
Client: HARNETT CO., NC	Project: NC PARKS & RECREATION	
Project Title: PRELIMINARY SOILS/SITE EVALUATION MAP		

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