



Soil & Environmental Consultants, PA

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July 31, 2006
Project #10,140.S2

Village Investment LLC
Attn: David Ferrell
1600 Morrisville-Carpenter Rd.
Cary, NC 27519

Re: Detailed Subsurface/Preliminary Surface Soil/Site Evaluation on an additional 20-Acre Site
Adjacent to Highway 751 --Chatham County, NC

Dear Mr. Ferrell:

Soil & Environmental Consultants, PA (S&EC) performed a detailed subsurface/preliminary surface soil and site evaluation on the above referenced tract. This was performed at your request as part of the preliminary planning process in order to determine areas of soil that have potential for surface and subsurface wastewater disposal. Fieldwork was performed on February 27-28 and July 25, 2006.

S&EC traversed 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, an evaluation of the site was developed, relative to surface and subsurface disposal of wastewater. Surface soil boundaries were sketched onto the accompanying soil map. Subsurface soil boundaries were flagged in the field and were located by S&EC using a GPS unit. 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 Triassic Basin region of Chatham County. The upland soils on this tract are similar to the Granville and Creedmoor soil series. The Granville soil series has a sandy loam surface material over a clay loam subsoil. These soils are at least 24 inches deep to prohibitive soil characteristics and are generally useable for subsurface septic systems. The Creedmoor soils have expansive clay mineralogy and wetness and are generally unsuitable for conventional subsurface septic systems, but have potential for surface drip and/or spray irrigation systems.

The accompanying GPS/AutoCAD map indicates the areas with potential use for subsurface wastewater disposal. Areas with potential for subsurface drip and surface wastewater systems are also sketched on the map. The yellow hatched units indicate areas of soils which are at least 24 inches deep to prohibitive soil characteristics and these areas have potential for a conventional septic system, a modified conventional (shallow placed lines with no fill required over the disposal area) or a low pressure pipe system (LPP) and/or ultra-shallow conventional (shallow placed lines with fill required over the disposal field) system. The green honeycomb areas are soils with 12 to 18 inches of useable material and have potential for pretreatment subsurface drip

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systems. The blue cross hatched areas contain soils with potential for surface applied systems (surface spray or drip). Unit "UN" on the attached map indicates areas of soils that are less than 12 inches to prohibitive soil characteristics and are generally unsuitable for the type of systems mentioned above. Pretreatment and surface systems (spray or drip) are expensive and if requested, S&EC can provide additional information concerning these types of systems.

Due to the thick vegetation on the site, there may be a need to make field adjustments to the detailed and preliminary soil lines in order to accommodate possible topographic irregularities that are covered up by the thick vegetation.

The site plan for each lot must ensure that adequate soil area for system and repair is unaffected by site elements (house placement, driveway, wells, patios, decks, etc.) on that, or adjacent lots. The area ultimately designated by the appropriate permitting agency 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 or state Division of Water Quality, depending on the type of septic system specified. A lot 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 systems may be required as part of the individual lot development process.

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 (120 gallons/bedroom/day in residences), 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 (10'), top of embankment (15'), watershed buffers, etc. (see Attachment 1). Additional setbacks must be maintained with surface drip and spray systems (see Attachment 2).

The utility of a potentially useable soil area for a subsurface system is most accurately determined by an on-ground layout of the proposed system. The total area needed for system and repair areas will depend upon the system type, the layout of that system and the total design flow (factors mentioned above). A typical area needed for a four bedroom residence is approximately 14,000 to 16,000 ft² (could be more depending on site features) or 800 to 920 linear feet of conventional line (system and repair) or 1920 linear feet of LPP line (system and repair). These estimates reference Laws and Rules for Sewage Treatment and Disposal Systems for North Carolina and use a LTAR of 0.25-0.30 gpd/ft² for conventional septic systems (.1955), a LTAR of 0.25-0.30 gpd/ft² for modified conventional (.1956) and 0.10 gpd/ft² for LPP septic systems (.1957a). The health department will determine the ultimate LTAR after their lot evaluation. S&EC will be glad to assist in any system layout or sizing calculations if requested.

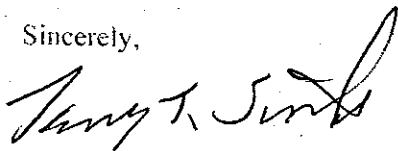
This report discusses the general location of potentially useable soils for on-site subsurface and surface wastewater disposal and, of course, does not constitute or imply any approval or permit as needed by the client from the local health department or state Division of Water Quality. S&EC is a professional 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.

An individual septic system permit will be required for each lot prior to obtaining a building permit. This will involve a detailed evaluation by the appropriate permitting agency to determine, among other things, system size and layout, well, drive and house location. Only after developing this information can a final determination be made concerning specifics of system design and site utilization.

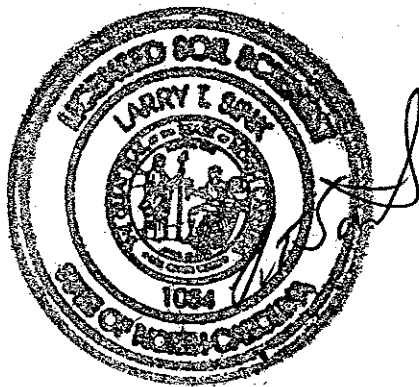
Soil & Environmental Consultants, PA is pleased to be of service in this matter and we look forward to assisting in any site analysis needs you may have in the future. Please feel free to call with any questions or comments.

Sincerely,



Larry Sink
NC Licensed Soil Scientist #1054

Encl: Attachment 1
Soil Suitability Map



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-1 | 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.



Attachment 2

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SETBACKS FOR SURFACE DRIP AND SPRAY IRRIGATION

<u>DRIP</u>	<u>SPRAY</u>	<u>PARAMETER</u>
10'	100'	INTERCEPTOR DRAINS, AND SURFACE WATER DIVERSIONS (UPSLOPE FROM SYSTEM).
15'	200'	RESIDENCE FOUNDATION / BASEMENT
15	15'	2' CUT EMBANKMENT.
25'	100'	INTERCEPTOR DRAINS, SURFACE WATER DIVERSIONS, AND GROUND WATER LOWERING / SURFACE DRAINAGE DITCHES. (DOWNSLOPE FROM SYSTEM),
50'	50'	PUBLIC RIGHT-OF-WAY SURFACE DISPOSAL
50'	150'	ANY PROPERTY LINE
100'	400'	PLACE OF PUBLIC ASSEMBLY OR HABITABLE RESIDENCE OFF PROPERTY.
100'	100'	ANY SWIMMING POOL, ANY WELL, ANY PUBLIC OR PRIVATE WATER SUPPLY, AND ANY LAKE OR IMPOUNDMENT.

- SOME COUNTIES (i.e., WAKE) MAY HAVE ADDITIONAL FOUNDATION SETBACK REQUIREMENTS.
- ANY OR ALL OF THESE SETBACKS MAY BE VARIED IF THE ADJACENT PROPERTY OWNERS SIGN A WAIVER/PERMISSION NOTICE.
- SETBACKS FOR TERTIARY TREATED EFFLUENT TO BE APPLIED TO GOLF COURSES VARY FROM THIS TABLE.

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