S&EC

Soil & Environmental Consultants, PA

11010 Raven Ridge Road • Raleigh, North Carolina 27614 • Phone: (919) 846-5900 • Fax: (919) 846-9467
www.SandEC.com

May 9, 2007
Project #10046.S1

Spang Development Company
Attn: Bill Spang
111 Cloister Court
Chapel Hill, NC 27514

Re: Detailed Soil/Site Evaluation on 62+/- Acre Site located at intersection of Mann's Chapel Road and Tobacco Road in Chatham County, NC.

Dear Mr. Spang:

Soil & Environmental Consultants, PA (S&EC) performed a detailed soil/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 subsurface wastewater disposal. Fieldwork was performed in January of 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 dry soil conditions. From these observations, an evaluation of the site, relative to subsurface disposal of wastewater, was developed. 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 acid crystalline region of Chatham County. The upland soils on this tract are similar to the Wedowee, Louisburg and Vance soil series. The Wedowee and Vance soil series have a sandy loam surface material over clay subsoil. These soils are 24-30+ inches deep to prohibitive soil characteristics and are generally useable for conventional, modified conventional, ultra-shallow, and/or LPP low pressure pipe septic systems. The Louisburg soils are shallow to rock parent material, and are therefore less than 24 inches deep to prohibitive soil characteristics (parent material) and are unsuitable for the type of subsurface septic systems mentioned above.

The accompanying GPS/AutoCAD map indicates the areas with potential use for subsurface wastewater disposal. **Areas within the gray line indicate areas of soils that are at least 24 inches deep to prohibitive soil characteristics, and the approximate size of these areas is +/- 37 acres. We had many site meetings with the Chatham County Health Department in order to confirm the suitable soils on each proposed lot.**

The site plan for each lot/site 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 health department on the site plan for the septic system and repair must remain undisturbed (no mechanical clearing, excavation, heavy

Charlotte Office:
236 LePhillip Court, Suite C
Concord, NC 28025
Phone: (704) 720-9405
Fax: (704) 720-9406

Greensboro Office:
3817-E Lawndale Drive
Greensboro, NC 27455
Phone: (336) 540-8234
Fax: (336) 540-8235

traffic or other significant site disturbing activities) until authorized by the health department. A lot with initially adequate useable soil area may be rendered unusable as a result of improper site planning and/or disturbance.

GENERAL WASTEWATER CONSIDERATIONS

Once potentially useable areas were 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 was 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 (50', 100'), streams and ponds (50') or more (depending on watershed regulations), property lines (10'), 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. **The Chatham County Health Department determined the proposed lots that needed a septic system layout of the initial and repair areas. S&EC performed the required septic system layouts on lots 22, 23, and all offsite areas (1A, 24, 25, 26, 27, 38, 39, & 40).**

Ultimately, the total area needed for system and repair areas will depend upon the system type, the long term acceptance rate, and the total design flow (factors mentioned above). A typical area needed for a five bedroom residence is approximately 20,000 to 22,000 ft^2 (could be more depending on site features) or 1200 to 1600 linear feet of conventional line (system and repair) or 1000 linear feet of line (system and repair) for Type IIIg Graveless or 2400 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 0.3 gpd/ft^2 for conventional septic systems (.1955), a LTAR of 0.3 gpd/ft^2 for modified conventional (.1956) and 0.1gpd/ft^2 for LPP septic systems (.1957a). The Chatham County health department will determine the ultimate LTAR after each individual lot evaluation. The table below is a summary of all the information reflected in this report.

LOT NUMBER	SUITABLE SOIL AREA (SQ. FT.)	PROPOSED LTAR (GPD/FT2)	LAYOUT LENGTH LINEAR FT	HOUSE SIZE # OF BEDROOMS	DAILY FLOW GPD	SYSTEM TYPE
1A	51,775	0.3	1005	5	600	GRAVELESS
1B	36,638	0.3	NA	5	600	NA
2	38,531	0.3	NA	5	600	NA
3	33,641	0.3	NA	5	600	NA
4	34,565	0.3	NA	5	600	NA
5	24,629	0.3	NA	5	600	NA
6	22,112	0.3	NA	5	600	NA
7	36,105	0.3	NA	5	600	NA
8	42,111	0.3	NA	5	600	NA
9	45,800	0.3	NA	5	600	NA
10	33,644	0.3	NA	5	600	NA
11	42,514	0.3	NA	5	600	NA
12	37,259	0.3	NA	5	600	NA
13	21,158	0.3	NA	5	600	NA

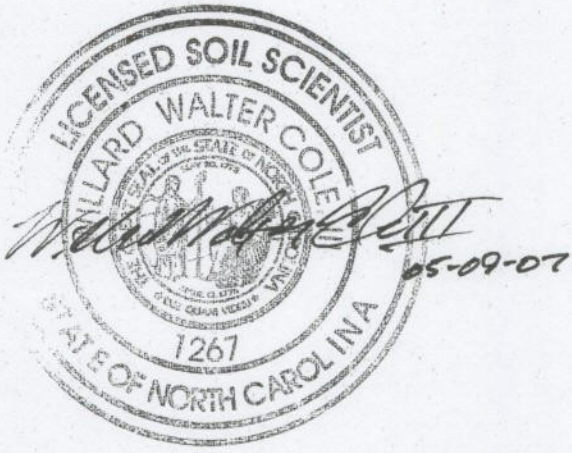
14	25,282	0.3	NA	5	600	NA
15	30,612	0.3	NA	5	600	NA
16	34,716	0.3	NA	5	600	NA
17	40,783	0.3	NA	5	600	NA
18	41,105	0.3	NA	5	600	NA
19	38,090	0.3	NA	5	600	NA
20	37,259	0.3	NA	5	600	NA
21	41,822	0.3	NA	5	600	NA
22	40,469	0.3	1460	5+	600+	GRAVELESS
23	24,944	0.3	1000	5	600	GRAVELESS
24	33,416	0.3	1175	5	600	GRAVELESS
25	26,822	0.3	1260	5+	600+	GRAVELESS
26	23,231	0.3	1155	5	600	GRAVELESS
27	25,182	0.3	1135	5	600	GRAVELESS
28	27,097	0.3	NA	5	600	NA
29	45,057	0.3	NA	5	600	NA
30	45,209	0.3	NA	5	600	NA
31	26,771	0.3	NA	5	600	NA
32	47,332	0.3	NA	5	600	NA
33	32,462	0.3	NA	5	600	NA
34	26,383	0.3	NA	5	600	NA
35	37,231	0.3	NA	5	600	NA
36	49,000	0.3	NA	5	600	NA
37	34,845	0.3	NA	5	600	NA
38	19,789	0.3	620	3	360	GRAVELESS
39	20,226	0.3	910	4	480	GRAVELESS
40	20,677	0.3	800	4	480	GRAVELESS

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 heath department. 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 improvements permit will be required for this lot prior to obtaining a building permit. This will involve a detailed evaluation by the local health department 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,



Walter Cole
NC Licensed Soil Scientist #1267
Registered Sanitarian #1510

Encl: Attachment 1
Layout Specifications
Detailed Soils & Septic System Layout 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-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.

TOBACCO ROAD LOT 22

Project No. 10046.S2

LAYOUT FOR 5 BEDROOM HOME — OCTOBER 13,2006

LINE #	FLAG COLOR	BS	HI	FS	ELEVATION	FLAGGED LINE LENGTH	DESIGN LINE LENGTH
TBM		7.4			100.00		
INSTR. 1			107.40				
1	ORANGE			1.70	105.70	55	55
2	PINK			2.40	105.00	75	75
3	YELLOW			3.30	104.10	95	95
4	BLUE			4.20	103.20	135	135
5	ORANGE			5.40	102.00	180	180
6	RED			6.00	101.40	225	200
***7A**	**YELLOW**			**7.10**	**100.30**	**295**	**140**
***7B**	**YELLOW**			**7.10**	**100.30**	**0**	**140**
***8A**	**PINK**			**7.70**	**99.70**	**310**	**140**
***8B**	**YELLOW**			**7.10**	**100.30**	**0**	**140**
9	ORANGE			8.40	99.00	75	75
10	WHITE			9.00	98.40	65	60
					Total	**1510**	**1435**

	LINE LENGTH	LTAR GPD/FT^2	SYSTEM TYPE	SOIL LTAR GPD/FT^2	INNOVATIVE SYSTEM	DISTRIBUTION
**** System***	***420***	***0.30***	***INNOV.***	***0.30***	***EZ-Flow***	**PUMP TO D BOX**
Repair	875	0.30	*Innov.*	0.30	GRAVEL	PUMP SERIAL

Notes:

** TBM ON GROUND AT TREE

**TBM is assumed to be 100'.

**All measures in feet.

**Nitrification lines are demonstrated on contour via colored pin flags.

**BS, FS indicate rod readings.

TOBACCO ROAD LOT 23

Project No. 10046.S1

LAYOUT FOR 5 BEDROOM HOME — OCTOBER 9,2006

LINE #	FLAG COLOR	BS	HI	FS	ELEVATION	FLAGGED LINE LENGTH	DESIGN LINE LENGTH
TBM		2.4			100.00		
INSTR. 1			102.40				
1	WHITE			2.80	99.60	90	90
***2**	**RED**			**3.30**	**99.10**	**80**	**80**
3	BLUE			4.10	98.30	70	70
4	YELLOW			4.50	97.90	70	70
5	WHITE	3.4		5.10	97.30	95	95
6	RED		100.7	3.90	96.80	100	100
***7**	**BLUE**			**4.30**	**96.40**	**80**	**80**
***8**	**YELLOW**			**5.20**	**95.50**	**95**	**95**
***9**	**WHITE**			**5.60**	**95.10**	**85**	**85**
10	RED			6.00	94.70	75	75
***11**	**WHITE**			**6.40**	**94.30**	**80**	**80**
***12**	**YELLOW**			**6.80**	**93.90**	**80**	**80**
					Total	**1000**	**1000**

	LINE LENGTH	LTAR GPD/FT^2	SYSTEM TYPE	SOIL LTAR GPD/FT^2	INNOVATIVE SYSTEM	DISTRIBUTION
**** System***	***500***	***0.30***	***INNOV.***	***0.30***	***EZ-Flow***	**PUMP**
						SERIAL
Repair	500	0.30	*Innov.*	0.30	EZ-Flow	PUMP
						SERIAL

Notes:

** TBM ON GROUND AT TREE

**TBM is assumed to be 100'.

**All measures in feet.

**Nitrification lines are demonstrated on contour via colored pin flags.

**BS, FS indicate rod readings.

TOBACCO ROAD OFFSITE FOR LOTS 1 A, 24-27

Project No. 9876.S4

LAYOUT FOR 5-BEDROOM HOMES — OCTOBER 9,2006

LINE #	FLAG COLOR	BS	HI	FS	ELEVATION	FLAGGED LINE LENGTH	DESIGN LINE LENGTH
TBM		4.3			100.00		
INSTR. 1			104.30				
1	YELLOW			0.30	104.00	105	VARIES
2	WHITE			0.90	103.40	105	VARIES
3	RED			1.50	102.80	145	VARIES
4	BLUE	0.1		2.40	101.90	240	VARIES
5	ORANGE		102.00	0.30	101.70	255	VARIES
6	YELLOW			0.80	101.20	265	VARIES
7	PINK			1.40	100.60	295	VARIES
8	RED			1.80	100.20	385	VARIES
9	BLUE			2.60	99.40	355	VARIES
10	RED			5.40	98.90	125	VARIES
11	BLUE			5.60	98.70	100	VARIES
12	WHITE			6.00	98.30	140	VARIES
13	YELLOW			6.20	98.10	100	VARIES
14	RED			6.80	97.50	90	VARIES
15	WHITE			7.30	97.00	55	VARIES
16	ORANGE	3.4		5.70	98.60	560	VARIES
17	WHITE		102.00	4.10	97.90	520	VARIES
18	YELLOW			4.70	97.30	495	VARIES
19	RED			5.50	96.50	400	VARIES
20	BLUE			6.30	95.70	360	VARIES
21	WHITE			6.90	95.10	320	VARIES
22	ORANGE			7.50	94.50	215	VARIES
23	YELLOW			8.30	93.70	220	VARIES
24	RED			9.00	93.00	240	VARIES
25	BLUE			9.80	92.20	225	VARIES
26	ORANGE			10.60	91.40	215	VARIES
27	YELLOW			11.40	90.60	125	VARIES
28	BLUE			12.10	89.90	170	VARIES
29	RED			12.90	89.10	105	VARIES
30	YELLOW			13.70	88.30	80	VARIES
31	ORANGE			14.50	87.50	60	VARIES
					Total	**7070**	

SOIL

Notes:

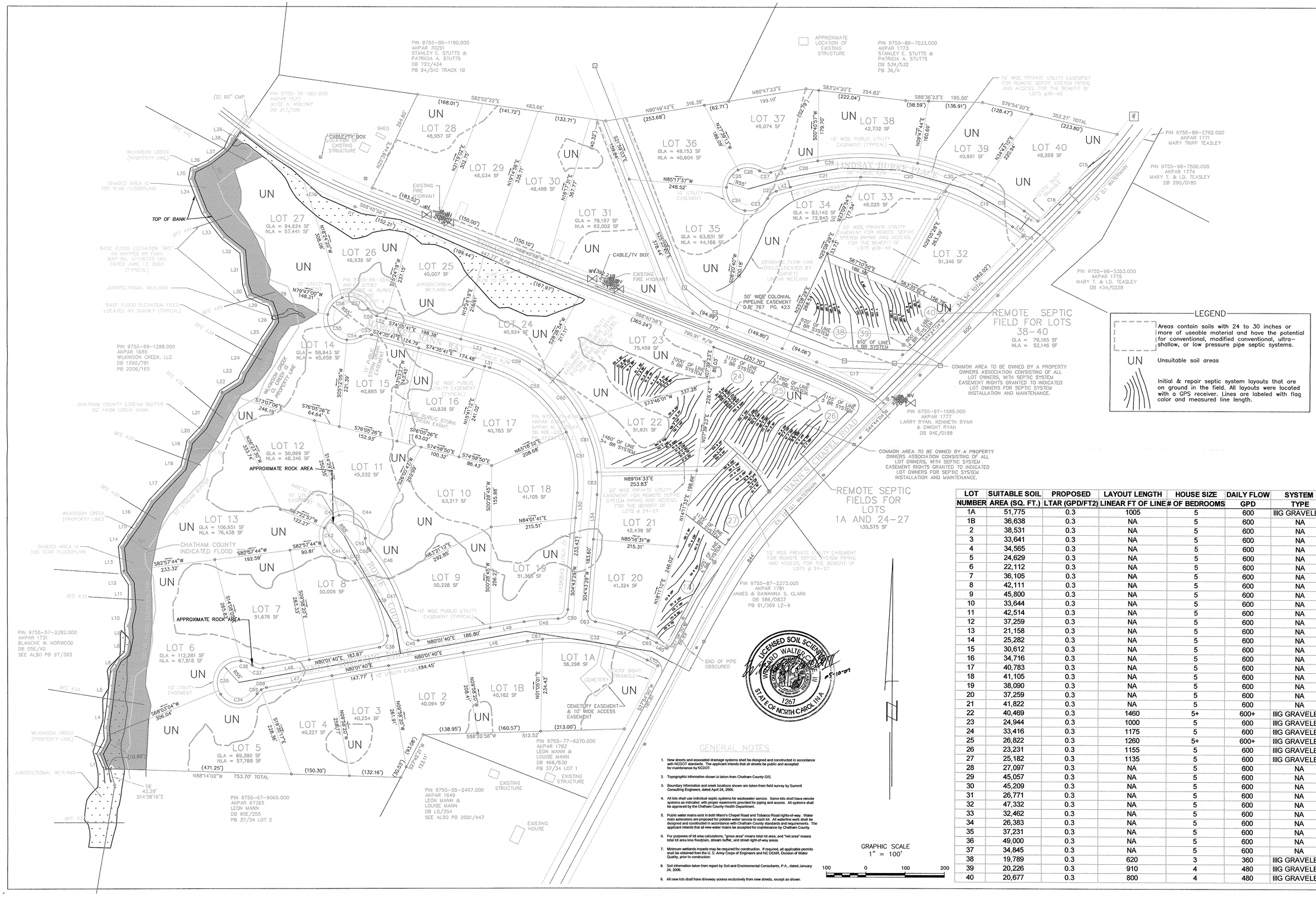
** TBM ON GROUND AT TREE

**TBM is assumed to be 100'.

**All measures in feet.

**Nitrification lines are demonstrated on contour via colored pin flags.

**BS, FS indicate rod readings.



LEGEND

Areas contain soils with 24 to 30 inches or more of useable material and have the potential for conventional, modified conventional, ultra-shallow, or low pressure pipe septic systems.

UN — Unsuitable soil areas

Initial & repair septic system layouts that are on ground in the field. All layouts were located with a GPS receiver. Lines are labeled with flag color and measured line length.

GENERAL NOTES

1. New streets and associated drainage systems shall be designed and constructed in accordance with NCDOT standards. The applicant intends that all streets be public and accepted for maintenance by NCDOT.
2. Topographic information shown is taken from Chatham County GIS.
3. Boundary information and creek locations shown are taken from field survey by Summit Consulting Engineers, dated April 24, 2006.
4. All lots shall use individual septic systems for wastewater service. Some lots shall have remote systems as indicated, with proper easements provided for piping and access. All systems shall be approved by the Chatham County Health Department.
5. Public water mains exist in both Mann's Chapel Road and Tobacco Road rights-of-way. Water main extensions are proposed for potable water service to each lot. All waterline work shall be designed and constructed in accordance with Chatham County standards and requirements. The applicant intends that all new water mains be accepted for maintenance by Chatham County.
6. For purposes of lot area calculations, "gross area" means total lot area; and "net area" means total lot area less floodplain, stream buffer, and street right-of-way areas.
7. Minimum wetlands impacts may be required for construction. If required, all applicable permits shall be obtained from the U. S. Army Corps of Engineers and NC DENR, Division of Water Quality, prior to construction.
8. Soil information taken from report by Soil and Environmental Consultants, P.A., dated January 24, 2006.
9. All new lots shall have driveway access exclusively from new streets, except as shown.

LOT NUMBER	SUITABLE SOIL AREA (SQ. FT.)	PROPOSED LTAR (GPD/FT2)	LAYOUT LENGTH LINEAR FT OF LINE	HOUSE SIZE # OF BEDROOMS	DAILY FLOW GPD	SYSTEM TYPE
1A	51,775	0.3	1005	5	600	IIIG GRAVELESS
1B	36,638	0.3	NA	5	600	NA
2	38,531	0.3	NA	5	600	NA
3	33,641	0.3	NA	5	600	NA
4	34,565	0.3	NA	5	600	NA
5	24,629	0.3	NA	5	600	NA
6	22,112	0.3	NA	5	600	NA
7	36,105	0.3	NA	5	600	NA
8	42,111	0.3	NA	5	600	NA
9	45,800	0.3	NA	5	600	NA
10	33,644	0.3	NA	5	600	NA
11	42,514	0.3	NA	5	600	NA
12	37,259	0.3	NA	5	600	NA
13	21,158	0.3	NA	5	600	NA
14	25,282	0.3	NA	5	600	NA
15	30,612	0.3	NA	5	600	NA
16	34,716	0.3	NA	5	600	NA
17	40,783	0.3	NA	5	600	NA
18	41,105	0.3	NA	5	600	NA
19	38,090	0.3	NA	5	600	NA
20	37,259	0.3	NA	5	600	NA
21	41,822	0.3	NA	5	600	NA
22	40,469	0.3	1460	5+	600+	IIIG GRAVELESS
23	24,944	0.3	1000	5	600	IIIG GRAVELESS
24	33,416	0.3	1175	5	600	IIIG GRAVELESS
25	26,822	0.3	1260	5+	600+	IIIG GRAVELESS
26	23,231	0.3	1155	5	600	IIIG GRAVELESS
27	25,182	0.3	1135	5	600	IIIG GRAVELESS
28	27,097	0.3	NA	5	600	NA
29	45,057	0.3	NA	5	600	NA
30	45,209	0.3	NA	5	600	NA
31	26,771	0.3	NA	5	600	NA
32	47,332	0.3	NA	5	600	NA
33	32,462	0.3	NA	5	600	NA
34	26,383	0.3	NA	5	600	NA
35	37,231	0.3	NA	5	600	NA
36	49,000	0.3	NA	5	600	NA
37	34,845	0.3	NA	5	600	NA
38	19,789	0.3	620	3	360	IIIG GRAVELESS
39	20,226	0.3	910	4	480	IIIG GRAVELESS
40	20,677	0.3	800	4	480	IIIG GRAVELESS

JOB NO. 10046.s2
PROJECT MGR. WC
DRAWN WC
FIELD WORK WC, SM, ES
SCALE 1" = 100'
FILE SEC/10046/FINALMAP
REVISIONS:

Soil & Environmental Consultants, PA
11010 Raven Ridge Road · Raleigh, North Carolina 27614 · Phone: (919) 846-5900 · Fax: (919) 846-9467
www.SandEC.com

PROJECT NAME: SPANG DEVELOPMENT – MANN'S CHAPEL PROPERTIES, LLC – CHATHAM COUNTY MAY 2007

SHEET TITLE: DETAIL SOILS EVALUATION & SEPTIC SYSTEM LAYOUTS

SHEET 1 OF 1