Soil Suitability for Domestic Sewage Treatment and Disposal Systems

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McArthur Road
Broadway, NC 27505
Harnett County

PIN 9691-02-0038.000

Prepared For:	Brandon Harrington, Harrington Properties
Prepared By:	Sloan Griffin, SanLee Environmental, LLC
Report Date:	March 17, 2020

Soil Suitability for Domestic Sewage Treatment and Disposal Systems
McArthur Road, Broadway, NC (Harnett County)

PREPARED FOR: Brandon Harrington, Harrington Properties

PREPARED BY: Sloan Griffin, LSS #1333

DATE: March 17, 2020

Soil suitability for domestic sewage treatment and disposal systems was evaluated on March 14, 2020, for property located off McArthur Road in Broadway, NC. Sloan Griffin of SanLee Environmental, LLC conducted the soil evaluation. The detailed soil evaluation of the land area will follow. A property reference map is provided in Attachment 1. A review of the soil and landscape characteristics that dictate soil suitability for domestic sewage treatment and disposal systems can be found in Attachment 2. The property is within an agricultural field currently in cultivation on a hill and upland side slope (Attachment 3).

Soil Suitability for Domestic Sewage Treatment and Disposal Systems (General)
The aerial map in Attachment 3 details the approximate property boundaries, soil boring locations, soil types, and soil areas for septic systems. Approximately 10 soil borings were advanced to delineate the provisionally suitable soils area on the property (Attachment 3). A portion of the property contained unsuitable soils or unsuitable landscape position and, thus, are unsuitable for septic systems. However, this evaluation was merely a preliminary review to determine what potential this land might have for domestic sewage treatment and disposal systems. Therefore, specific types of septic systems, exact locations of future drainfields and repair areas, plus buffers from property lines (current and potential future lot lines), building foundations, wells, etc. are not fully considered. These things will need to be more fully considered as the plans develop for the potential future of this site. It is possible that additional soil evaluations will be required once lot layouts are considered and developed for this property so that septic system types and the location of a septic drainfield can be more fully and appropriately considered. The suitable soils area, as denoted by the green hatched area on each of the 5 lots (see map in Attachment 3), exhibited soil characteristics and soil depths (24" or greater) that is provisionally suitable for conventional trench septic systems

Typical profile descriptions of the provisionally suitable soil for this property are in Attachment 4.

The provisionally suitable soil borings had the following characteristics. Soil texture was provisionally suitable and was estimated to be loam to sandy loam near the soil surface (A horizons) and sandy clay loam to sandy clay in the subsoil (B horizons). Soil structure was provisionally suitable and was estimated to be granular near the soil surface (A horizons) and weak subangular blocky in the subsoil (B horizons). Clay mineralogy was provisionally suitable with very friable to firm moist soil consistence and non-sticky to sticky and non-plastic to plastic wet soil consistence. A possible restrictive horizon was found in some of the borings within the E horizon due to the amount of gravel found during the soil borings. The extent of the gravel concentration will need to be more fully evaluated to determine if a restrictive horizon is truly present.

The major soil type on this property is a Gilead loamy sand (map symbol GaB) and Bibb loam (map symbol Bb). The Harnett County Soil Survey indicates that severe limitations exist for septic systems installed in these soils types (Attachment 5).

The land area required for a conventional or shallow conventional septic system is calculated based on the size of the proposed home and the Long-Term Acceptance Rate (LTAR) of the soil. The LTAR range for the provisionally suitable soils on this property is 0.1 – 0.4 GPD/ft^2 based on the most restrictive soil texture in the subsoil. Table 1 below presents estimated conventional or shallow conventional septic system land area requirements for several home sizes and LTAR's on this property. The most limited LTAR suggested by SanLee Environmental, LLC for a portion of the provisionally suitable soil is 0.3 GPD/ft^2, but the final LTAR for specific septic system types and septic drainfield locations will be set by the Harnett County Health Department depending on the final house site and drainfield location. The detailed computations are in Attachment 6.

Table 1. Estimated Conventional Septic System Land Requirements (including repair area) for Several Home Sizes and Long-Term Acceptance Rates (LTAR) on this Property.

House Size	Long-Term Acceptance Rate (LTAR)	Area Required for Conventional Septic System	Minimum Area Required for Innovative Conventional Septic System
	-----GPD/ft^2-----	-----ft^2-----	-----ft^2-----
3 bedrooms	0.1 – 0.4	6,750 – 32,400	8,100 – 24,300
3 bedrooms	0.3	~10,800	~9,000
4 bedrooms	0.1 – 0.4	9,000 – 43,200	6,750 – 32,400
4 bedrooms	0.3	~14,400	~12,000
5 bedrooms	0.1 – 0.4	11,250 – 54,000	8,438 – 40,500
5 bedrooms	0.3	~18,000	~15,000

Lot 1

Comprised of 41,367 sq ft of usable soil, lot 1 contained a Bt horizon with a firm sandy clay to clay with weak subangular blocky structure that was underlain by a friable sandy clay loam with weak subangular blocky structure in the soil profile. The underlying SCL strata entered the profile around 21 to 24 inches in most borings and appears to support an elevated loading rate of 0.45 gpd/sq. ft. at a trench depth of 24". It is advisable to extend the trench bottom into the friable SCL material to prevent saturation of the clay if installed shallow into the Bt horizon due to hydraulic concerns of the texture differential.

Lot 2

Comprised of 45,498 sq ft of usable soil, lot 2 contained two varying soil profiles. The soil profile found at the front of the lot is noted by a 0-17" Sandy Loam A horizon, 17" to 23" Loam E horizon, over a 23" to 36" Sandy Clay Loam to Sandy Clay Bt horizon. The Bt horizon appears to support a loading rate of 0.3 gpd/sq. ft. at a trench depth of 18". The soil profile found at the back of the lot along the terrace and side slope is noted by a 0-8" Sandy Loam A horizon over a 8" to 36" Sandy Loam B horizon. The B horizon appears to support a loading rate of 0.6 gpd/sq. ft. at a trench depth of 24".

Lot 3

Comprised of 45,001 sq ft of usable soil, lot 2 contained two varying soil profiles. The soil profile found at the front of the lot is noted by a 0-17" Sandy Loam A horizon, 17" to 23" Loam E horizon, over a 23" to 36" Sandy Clay Loam to Sandy Clay Bt horizon. The Bt horizon appears to support a loading rate of 0.3 gpd/sq. ft. at a trench depth of 18". The soil profile found at the back of the lot along the terrace and side slope is noted by a 0-8" Sandy Loam A horizon over a 8" to 36" Sandy Loam B horizon. The B horizon appears to support a loading rate of 0.6 gpd/sq. ft. at a trench depth of 24".

Lot 4

Comprised of 39,434 sq ft of usable soil, lot 2 contained two varying soil profiles. The soil profile found at the front of the lot is noted by a 0-17" Sandy Loam A horizon, 17" to 23" Loam E horizon, over a 23" to 36" Sandy Clay Loam to Sandy Clay Bt horizon. The Bt horizon appears to support a loading rate of 0.3 gpd/sq. ft. at a trench depth of 18". The soil profile found at the back of the lot along the terrace and side slope is noted by a 0-8" Sandy Loam A horizon over a 8" to 36" Sandy Loam B horizon. The B horizon appears to support a loading rate of 0.6 gpd/sq. ft. at a trench depth of 24".

Lot 5

Comprised of 34,662 sq ft of usable soil, lot 5 exhibited some chroma 2 mottling between 34 and 36 inches within Bt horizon. The sandy clay loam to sandy clay texture of the soil, coupled with the weak subangular blocky structure, lends to a loading rate of 0.3 gpd/sq. ft. at a trench depth of 22".

Conclusions

Based on the results of this evaluation, the installation of a conventional septic system seems probable on each of the 5 properties, however house size and location may affect usable soils area and available space. The tract of land at the rear was not evaluated as part of the scope of this project as the tract remained greater than 10 acres in size.

We appreciate the opportunity to assist you in this matter. Please contact us with any questions, concerns, or comments.

ATTACHMENT 1: Property Reference Map

Harnett GIS

NOT FOR LEGAL USE .

Harnett COUNTY
NORTH CAROLINA

GIS/E-911 Addressing

March 16, 2020

N
W E
S

0 165 330 660 Feet

1 inch = 376 feet

ATTACHMENT 2: Review of Rules Pertaining to Domestic Sewage Treatment and Disposal Systems

Five categories of soil and landscape characteristics are evaluated to determine soil suitability for domestic sewage treatment and disposal systems and include: topography and landscape position, soil morphological characteristics, soil wetness conditions, soil depth, and restrictive horizons. The soil and landscape characteristics found in a particular location dictate the type(s) of domestic sewage treatment and disposal system that can be used on a parcel of land. The detailed rules can be found in Section .1900 – Sewage Treatment and Disposal Systems, but a general review of the five categories and other relevant rules can be found in the sections below.

.1940 TOPOGRAPHY AND LANDSCAPE POSITION

Uniform slopes less than 15 percent are considered suitable, uniform slopes between 15 and 30 percent are considered provisionally suitable, and slopes greater than 30 percent are considered unsuitable for domestic sewage treatment and disposal systems. Complex slope patterns and slopes dissected by gullies and ravines are considered unsuitable for domestic sewage treatment and disposal systems. Depressions and wetlands are also considered unsuitable for domestic sewage treatment and disposal systems.

.1941 SOIL MORPHOLOGICAL CHARACTERISTICS

Sandy and coarse loamy textured soils (sand, loamy sand, sandy loam, and loam) are considered suitable for domestic sewage treatment and disposal systems. Fine loamy and clayey textured soils (silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay) are considered provisionally suitable for domestic sewage treatment and disposal systems.

Crumb, granular, and single-grained soil structures are considered suitable for domestic sewage treatment and disposal systems. Blocky soil structures are considered provisionally suitable for domestic sewage treatment and disposal systems. Platy, prismatic, and massive soil structures are considered unsuitable for domestic sewage treatment and disposal systems.

Slightly expansive clay mineralogy is considered suitable for domestic sewage treatment and disposal systems. Slightly expansive clay minerals exhibit loose, very friable, friable, or firm moist soil consistence. Expansive clay mineralogy is considered unsuitable for domestic sewage treatment and disposal systems. Expansive clay minerals exhibit very firm or extremely firm moist soil consistence. Organic soils are considered unsuitable for domestic sewage treatment and disposal systems.

.1942 SOIL WETNESS CONDITIONS

Soil wetness conditions are caused by seasonal high water table, perched water table, tidal water, seasonally saturated soils, or lateral water movement. Soil wetness conditions are indicated by soil colors, either in mottles or mass, with a chroma of 2 or less according to the Munsell color charts. Soil wetness conditions detected 48 inches in depth or deeper are considered suitable for domestic sewage treatment and disposal systems. Soil wetness conditions detected between 36 to 48 inches in depth are considered provisionally suitable for domestic sewage treatment and disposal systems. Soil wetness conditions detected 36 inches in depth or shallower are considered unsuitable for domestic sewage treatment and disposal systems.

.1943 SOIL DEPTH
Soil depths to rock, parent material, or saprolite greater than 48 inches are considered suitable for domestic sewage treatment and disposal systems. Soil depths to rock, parent material, or saprolite between 36 and 48 inches are considered provisionally suitable for domestic sewage treatment and disposal systems. Soil depths to rock, parent material, or saprolite less than 36 inches are considered unsuitable for domestic sewage treatment and disposal systems. Saprolite has a massive, rock-controlled structure, and retains the mineral arrangement of its parent rock in at least 50 percent of its volume. Saprolite only forms from metamorphic and igneous rock parent materials and is typically referred to as "rotten rock".

.1944 RESTRICTIVE HORIZONS
Restrictive horizons are capable of perching ground water or sewage effluent and are strongly compacted or cemented. Restrictive horizons resist soil excavation or augering. Soils with restrictive horizons three inches or more in thickness at depths greater than 48 inches are considered suitable for domestic sewage treatment and disposal systems. Soils with restrictive horizons three inches or more in thickness at depths between 36 and 48 inches are considered provisionally suitable for domestic sewage treatment and disposal systems. Soils with restrictive horizons three inches or more in thickness at depths less than 36 inches are considered unsuitable for domestic sewage treatment and disposal systems.

.1950 LOCATION OF SANITARY SEWAGE SYSTEMS LEE COUNTY ENVIRONMENTAL HEALTH DEPARTMENT
No area for domestic sewage treatment and disposal system installation (or repair in Lee County) may be disturbed by clearing, excavation, filling, vehicle or equipment traffic, or storage of building materials.

.1947 DETERMINATION OF OVERALL SITE SUITABILITY
.1948 SITE CLASSIFICATION
All of the criteria for the five categories above are to be determined and classified as suitable, provisionally suitable, or suitable according to the respective rules described above. If all criteria are classified the same, that overall site classification will prevail. If there is a variation in the classification of several criteria, the most limiting classification will be used to determine the overall site classification.

A suitable classification generally indicates soil and landscape conditions favorable for the operation of a domestic sewage treatment and disposal system or slight limitations that can be readily overcome by proper design and installation. A provisionally suitable classification indicates soil and/or landscape conditions have moderate limitations for the operation of a domestic sewage treatment and disposal system, but modifications and careful planning, design, and installation can result in satisfactory system function. An unsuitable classification indicates severe soil and/or landscape limitations for the operation of a domestic sewage treatment and disposal system.

SUMMARY
Suitable/provisionally suitable landscapes and soils to a depth of 36 inches can, in general, be used for conventional gravity driven septic systems. Suitable/provisionally suitable landscapes

and soils to a depth of 24 –36 inches can, in general, be used for alternative septic systems such as shallow conventional and low pressure pipe systems, among others. All alternative systems for provisionally suitable landscapes and soils must be proposed to and approved by the Lee County Environmental Health Department. Any landscapes or soils classified as unsuitable may be reclassified as provisionally suitable by the Lee County Environmental Health Department after a site investigation by department personnel.

ATTACHMENT 3: Property Map Detailing Soil Suitability for Septic Systems and Soil Types

SanLee Environmental

Phone: 919-842-6263
SanLeeEnvironmental@gmail.com

Project:
Brandon Harrington
McArthur Road

Date:
March 17, 2020

Soil Borings

<18"	
18" - 20"	
20" - 24"	
24" - 36"	

Usable Soil Area

Lot 1 - 41,367 sq. ft.
Lot 2 - 45,498 sq. ft.
Lot 3 - 45,001 sq. ft.
Lot 4 - 39,434 sq. ft.
Lot 5 - 34,662 sq. ft.

Drawn By:
Sloan Griffin

1" = 200'

ATTACHMENT 4: Typical Profile Descriptions of Provisionally Suitable Soil

Property ID#: 9691-02-0038.000
Property Recorded: .
County: Harnett .

SOIL/SITE EVALUATION
FOR
ON-SITE WASTEWATER SYSTEM

Applicant: Brandon Harrington
Address: McArthur Road
Broadway, NC 27505
Location Site:
Water Supply: On Site Well__ Comm. Well__ Public X__ Other__

Buyer: X Agent:__ Phone:
Date Evaluated: 3/14/2020
Proposed Facility: Residential
Property Size: ~2 acre
Evaluation Method: Auger Boring X Pit__ Cut__

TYPICAL PROFILE

Horizon/ Depth (IN)	Matrix	Mottles	Mottle Abundance / Contrast	(a)(1) Texture	(a)(2) Structure	(a)(3) Mineralogy	Consistence Wet	Consistence Moist
A 0-17"		**None**	**None**	**SL**	**GR**	**SEXP**	**NS, NP**	**VFr**
E 17-23"		**None**	**None**	**L**	**GR**	**SEXP**	**NS, NP**	**Fr**
Bt 23-36"		**None**	**None**	**SCL/C**	**wSBK**	**SEXP**	**SS, SP**	**Fi**

.1940 Landscape Pos/Slope %	- Suitable, <15%	Profile LTAR	- 0.3 GPD/ft^2
.1942 Wetness Condition	- Suitable	System Type	- Provisionally suitable for conventional systems.
.1943/.1956 Saprolite	- Suitable		
.1944 Restrictive Horizon	- Suitable		
.1948 Profile Classification	- Provisionally Suitable		

Comments: E horizon was gravely in nature and trench media may need to be placed 100% into Bt horizon

TYPICAL PROFILE

Horizon/ Depth (IN)	Matrix	Mottles	Mottle Abundance /Contrast	(a)(1) Texture	(a)(2) Structure	(a)(3) Mineralogy	Consistence Wet	Consistence Moist
A 0 – 8"		**None**	**None**	**SL**	**Gr**	**SEXP**	**NS, NP**	**VFr**
B 8 – 36"		**None**	**None**	**SL**	**Gr**	**SEXP**	**NS, NP**	**VFr**

.1940 Landscape Pos/Slope %	- Provisionally Suitable	Profile LTAR	- 0.4 to 0.6 GPD/ft^2
.1942 Wetness Condition	- Suitable	System Type	- Provisionally suitable for conventional systems.
.1943/.1956 Saprolite	- Suitable		
.1944 Restrictive Horizon	- Provisionally Suitable		
.1948 Profile Classification	- Provisionally Suitable		

Comments:

EVALUATED BY: **Sloan Griffin**
COMMENTS:

LEGEND OF ABBREVIATIONS FOR SITE EVALUATION FORM

LANDSCAPE POSITION

CC - Concave Slope
CV - Convex Slope
DS - Debris Slump
D - Depression
DW - Drainage Way
FP - Flood Plain
FS - Foot Slope
H - Head Slope
I - Interflueve
L - Linear Slope
N - Nose Slope
P - Pocosin
R - Ridge
S - Shoulder
T - Terrace

TEXTURE GROUP

I
II
III
IV

TEXTURE CLASS

S - Sand
LS - Loamy Sand
SL - Sandy Loam
L - Loam
SCL - Sandy Clay Loam
CL - Clay Loam
SiL - Silt Loam
Si - Silt
SiCL - Silt Clay Loam
SC - Sandy Clay
C - Clay
SiC - Silty Clay
O - Organic

.1955 LTAR (gal/day/sqft)

1.2 - .08
0.8 - 0.6
0.6 - 0.3
0.4 - 0.1

STRUCTURE

G - Single Grain
M - Massive
CR - Crumb
GR - Granular
SBK - Subgranular Blocky
ABK - Angular Blocky
PL - Platy
PR – Prismatic

MOIST CONSISTENCE

Vfr - Very Friable
Fr - Friable
Fi - Firm
Vfi - Very Firm
Efi - Extremely Firm

MOTTLES

1 - Few
2 - Common
3 - Many

F - Faint
D - Distinct
P - Prominent

f - Fine
m - Medium
c - Coarse

WET CONSISTENCE

NS - Non Sticky
SS - Slightly Sticky
S - Sticky
VS - Very Sticky

NP - Non Plastic
SP - Slightly Plastic
P - Plastic
VP - Very Plastic

ATTACHMENT 5: Soil Survey Information

TABLE 10.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AnB Alpin	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
AtA Altavista	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness, too clayey.
Au Augusta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
AyA Aycock	Severe: percs slowly.	Moderate: seepage, wetness.	Moderate: too clayey.	Slight	Fair: too clayey.
AyB Aycock	Severe: percs slowly.	Moderate: seepage, slope, wetness.	Moderate: too clayey.	Slight	Fair: too clayey.
Bb Bibb	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
BnB Blaney	Severe: percs slowly, poor filter.	Severe: seepage.	Slight	Severe: seepage.	Good.
BnD Blaney	Severe: percs slowly, poor filter.	Severe: seepage, slope.	Moderate: slope.	Severe: seepage.	Fair: slope.
CaB Candor	Slight	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
CaD Candor	Moderate: slope.	Severe: seepage, slope.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
CeB Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
CeD Cecil	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope, hard to pack.
Ch*: Chewacla	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ch*:					
Congaree	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: thin layer.
Co	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
DoA	Severe: wetness, percs slowly.	Moderate: seepage.	Moderate: wetness.	Slight	Good.
DoB	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Moderate: wetness.	Slight	Good.
DtB	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Moderate: wetness, too clayey.	Severe: seepage.	Fair: too clayey, wetness.
DyF. Dystrochrepts					
EnB	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
EnD	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
ExA	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
FaB	Severe: percs slowly, poor filter.	Severe: seepage.	Moderate: too sandy.	Severe: seepage.	Poor: seepage.
FuB	Severe: percs slowly, poor filter.	Severe: seepage.	Moderate: too sandy.	Severe: seepage.	Poor: small stones.
GaA, GaB	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, hard to pack.
GaD	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness, slope.	Fair: too clayey, hard to pack, slope.
GoA	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Gr	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

ATTACHMENT 6: Septic System Area Computation Spreadsheets

Conventional Septic System Area Computation

Created by: SG
Created on: 6/20/2001
Updated on: 3/17/2020

Client Name:	*Harrington*	
Number Bedrooms:	*3*	
Design Flow (gal/day):	360	(120 gal/day/bedroom, minimum 240 gal/day/dwelling)
LTAR (gal/day/ft^2)	*0.1*	
Trench Bottom Area (ft^2):	3600	(Design flow/LTAR)
Trench Width (ft):	3	
On-center distance between trenches (ft):	9	
Trench Bottom Length (ft):	1200	
Minimum Field Area Required (ft^2):	10800	(Trench Bottom Length*Trench on-center distance)
Minimum Field Area Required (Innovative) (ft^2):	8100	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	27000	(Minimum field area*2.5)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	20250	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	32400	(Minimum field area*3)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	24300	(25% reduction from above)

(1) Provides for reserve area and soil irregularity, 2.5 to 3 is multiplier.

Client Name:	*Harrington*	
Number Bedrooms:	*3*	
Design Flow (gal/day):	360	(120 gal/day/bedroom, minimum 240 gal/day/dwelling)
LTAR (gal/day/ft^2)	*0.4*	
Trench Bottom Area (ft^2):	900	(Design flow/LTAR)
Trench Width (ft):	3	
On-center distance between trenches (ft):	9	
Trench Bottom Length (ft):	300	
Minimum Field Area Required (ft^2):	2700	(Trench Bottom Length*Trench on-center distance)
Minimum Field Area Required (Innovative) (ft^2):	2025	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	6750	(Minimum field area*2.5)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	5062.5	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	8100	(Minimum field area*3)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	6075	(25% reduction from above)

(1) Provides for reserve area and soil irregularity, 2.5 to 3 is multiplier.

Client Name:	*Harrington*	
Number Bedrooms:	*3*	
Design Flow (gal/day):	360	(120 gal/day/bedroom, minimum 240 gal/day/dwelling)
LTAR (gal/day/ft^2)	*0.3*	
Trench Bottom Area (ft^2):	1200	(Design flow/LTAR)
Trench Width (ft):	3	
On-center distance between trenches (ft):	9	
Trench Bottom Length (ft):	400	
Minimum Field Area Required (ft^2):	3600	(Trench Bottom Length*Trench on-center distance)
Minimum Field Area Required (Innovative) (ft^2):	2700	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	9000	(Minimum field area*2.5)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	6750	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	10800	(Minimum field area*3)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	8100	(25% reduction from above)

(1) Provides for reserve area and soil irregularity, 2.5 to 3 is multiplier.

Conventional Septic System Area Computation

Created by: SG
Created on: 6/20/2001
Updated on: 3/17/2020

Client Name:	*Harrington*	
Number Bedrooms:	*4*	
Design Flow (gal/day):	480	(120 gal/day/bedroom, minimum 240 gal/day/dwelling)
LTAR (gal/day/ft^2)	*0.1*	
Trench Bottom Area (ft^2):	4800	(Design flow/LTAR)
Trench Width (ft):	3	
On-center distance between trenches (ft):	9	
Trench Bottom Length (ft):	1600	
Minimum Field Area Required (ft^2):	14400	(Trench Bottom Length*Trench on-center distance)
Minimum Field Area Required (Innovative) (ft^2):	10800	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	36000	(Minimum field area*2.5)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	27000	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	43200	(Minimum field area*3)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	32400	(25% reduction from above)

(1) Provides for reserve area and soil irregularity, 2.5 to 3 is multiplier.

Client Name:	*Harrington*	
Number Bedrooms:	*4*	
Design Flow (gal/day):	480	(120 gal/day/bedroom, minimum 240 gal/day/dwelling)
LTAR (gal/day/ft^2)	*0.4*	
Trench Bottom Area (ft^2):	1200	(Design flow/LTAR)
Trench Width (ft):	3	
On-center distance between trenches (ft):	9	
Trench Bottom Length (ft):	400	
Minimum Field Area Required (ft^2):	3600	(Trench Bottom Length*Trench on-center distance)
Minimum Field Area Required (Innovative) (ft^2):	2700	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	9000	(Minimum field area*2.5)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	6750	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	10800	(Minimum field area*3)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	8100	(25% reduction from above)

(1) Provides for reserve area and soil irregularity, 2.5 to 3 is multiplier.

Client Name:	*Harrington*	
Number Bedrooms:	*4*	
Design Flow (gal/day):	480	(120 gal/day/bedroom, minimum 240 gal/day/dwelling)
LTAR (gal/day/ft^2)	*0.3*	
Trench Bottom Area (ft^2):	1600	(Design flow/LTAR)
Trench Width (ft):	3	
On-center distance between trenches (ft):	9	
Trench Bottom Length (ft):	533.3333	
Minimum Field Area Required (ft^2):	4800	(Trench Bottom Length*Trench on-center distance)
Minimum Field Area Required (Innovative) (ft^2):	3600	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	12000	(Minimum field area*2.5)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	9000	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	14400	(Minimum field area*3)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	10800	(25% reduction from above)

(1) Provides for reserve area and soil irregularity, 2.5 to 3 is multiplier.

Conventional Septic System Area Computation

Created by: SG
Created on: 6/20/2001
Updated on: 3/17/2020

Client Name:	*Harrington*	
Number Bedrooms:	*5*	
Design Flow (gal/day):	600	(120 gal/day/bedroom, minimum 240 gal/day/dwelling)
LTAR (gal/day/ft^2)	*0.1*	
Trench Bottom Area (ft^2):	6000	(Design flow/LTAR)
Trench Width (ft):	3	
On-center distance between trenches (ft):	9	
Trench Bottom Length (ft):	2000	
Minimum Field Area Required (ft^2):	18000	(Trench Bottom Length*Trench on-center distance)
Minimum Field Area Required (Innovative) (ft^2):	13500	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	45000	(Minimum field area*2.5)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	33750	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	54000	(Minimum field area*3)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	40500	(25% reduction from above)

(1) Provides for reserve area and soil irregularity, 2.5 to 3 is multiplier.

Client Name:	*Harrington*	
Number Bedrooms:	*5*	
Design Flow (gal/day):	600	(120 gal/day/bedroom, minimum 240 gal/day/dwelling)
LTAR (gal/day/ft^2)	*0.4*	
Trench Bottom Area (ft^2):	1500	(Design flow/LTAR)
Trench Width (ft):	3	
On-center distance between trenches (ft):	9	
Trench Bottom Length (ft):	500	
Minimum Field Area Required (ft^2):	4500	(Trench Bottom Length*Trench on-center distance)
Minimum Field Area Required (Innovative) (ft^2):	3375	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	11250	(Minimum field area*2.5)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	8437.5	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	13500	(Minimum field area*3)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	10125	(25% reduction from above)

(1) Provides for reserve area and soil irregularity, 2.5 to 3 is multiplier.

Client Name:	*Harrington*	
Number Bedrooms:	*5*	
Design Flow (gal/day):	600	(120 gal/day/bedroom, minimum 240 gal/day/dwelling)
LTAR (gal/day/ft^2)	*0.3*	
Trench Bottom Area (ft^2):	2000	(Design flow/LTAR)
Trench Width (ft):	3	
On-center distance between trenches (ft):	9	
Trench Bottom Length (ft):	666.6667	
Minimum Field Area Required (ft^2):	6000	(Trench Bottom Length*Trench on-center distance)
Minimum Field Area Required (Innovative) (ft^2):	4500	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	15000	(Minimum field area*2.5)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	11250	(25% reduction from above)
Total Field Area Required (ft^2)$^{(1)}$:	18000	(Minimum field area*3)
Total Field Area Required (Innovative) (ft^2)$^{(1)}$:	13500	(25% reduction from above)

(1) Provides for reserve area and soil irregularity, 2.5 to 3 is multiplier.

Thomas J. Boyce
P.O. Box 81
Pittsboro, NC 27312
919-868-8135
NC Licensed Soil Scientist # 1241
NC Registered Sanitarian # 1353

Kent Dickens
250 Dickens Farm Road
Moncure, NC 27559

Re: 20+ acre tract, McArthur Road, Harnett County, NC

Dear Mr. Dickens,

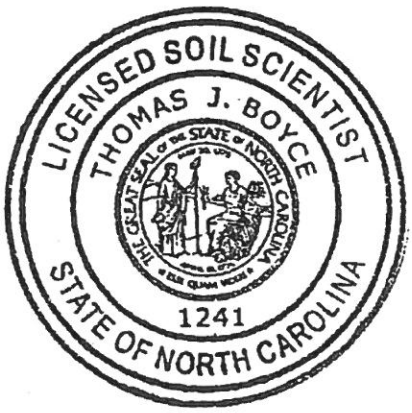
A soils evaluation, performed by soils auger, was completed on the above referenced tract in the fall of 2018. The purpose of the evaluation was to determine the ability of the soils to support a subsurface waste disposal system. All ratings were done in accordance with "Laws and Rules for Sewage Treatment and Disposal Systems, 15A NCAC 18A.1900".

The tract was evaluated by auger borings and landscape position. Only the open fied was evaluated. Typical soils in this area were twelve or more inches of sandy loam over a sandy clay loam or sandy clay for twenty-four or more inches. The loading rate for these soils should be .3-.5 gpd/sqft for a conventional or accepted system. Enclosed is a map showing the area evaluated.

This report does not guarantee or represent approval or issuance of permits as needed by the client from the local health department. This report only represents my professional opinion as a licensed soils scientist. Permits will only be issued if the local health department staff concurs with the findings of this report. I trust this is the information that you require at this time. If you have any questions, please call.

Sincerely,

Thomas J. Boyce



Harnett GIS