

Soil and Site Evaluation For  
Sewage Treatment and Disposal Systems  
Across from 251 Warren County Acres Rd  
Littleton, NC  
(APN: J2A 60C)

July 16, 2023

  
Gary S. Kreiser



**Findings:** Based on the soil and site evaluation, there is a high degree of certainty that there is enough space for conventional septic systems for three to five 4-bedroom houses, and the lot could be used for residential development.

No opinions are made regarding the following:

- Applicable zoning requirements;
- House location;
- Specific septic system layout/components; and
- Septic location to meet all horizontal setback requirements.

## INTRODUCTION

Soil & Septic Solutions performed an on-site subsurface wastewater system investigation on approximately 10.47 acres (APN: J2A 60C) located on Warren County Acres Rd in Warren County, North Carolina on July 8, 2023. The property was evaluated in accordance with North Carolina statutes for waste disposal ("Laws and Rules for Sewage Treatment and Disposal Systems", Sections .1940 through .1944). The purpose of this investigation was to locate suitable areas for three to five conventional on-site wastewater systems.

At the time of the survey, the review area was wooded. A 200 foot long 3 foot wide by 5 feet tall earthen mound was located near Woodhaven Drive.

## INVESTIGATION METHODOLOGY

Soil borings were made with a hand-turned auger in the study area. Observations of the landscape (slope, drainage patterns, past use, etc.) as well as soil properties (depth, texture, structure, seasonal wetness, restrictive horizons, etc.) to a depth of 48 inches when possible were recorded. Soil color was determined with a Munsell Soil Color Chart. From these observations, potentially suitable areas for wastewater disposal were identified.

A handheld global positioning system (GPS) with sub-meter accuracy was used to locate each soil boring as well as other pertinent site features.

## FINDINGS

On the day of the field investigation, fourteen (14) hand auger borings were made on the property, logged, and their locations are shown in the Soil Boring Location Exhibits. Soil Boring logs are attached. Slopes on the site ranged from 2 to 10 percent.

Landscape position with concave slope shape was the limiting factor for the site. There are geomorphic head slope areas that are at the head of drainageways that result in converging overland water flow as evidence by the presence of gullies and ephemeral channels. These areas are not suitable for septic systems. These areas are depicted in red in the Soil Boring Location Exhibit and is estimated to be about 45,000 ft<sup>2</sup>.

Most of the soil borings were suitable to provisionally suitable for soil depth. Soil borings ranged from 33 inches to 48 inches to saprolite. Only one boring (B7) had a depth of 26 inches. This area may need a shallow placed system. The suitable soil area for the whole property is estimated to be approximately 276,000 ft<sup>2</sup>. These areas include the required 10 foot property line setback requirement.

Based on the soil texture and depth to restrictive horizons a long-term acceptance rate (LTAR) of 0.3 gpd/ft<sup>2</sup> is recommended. Depending on the location of the system and the necessary slope correction the trench bottom depth will need to be calculated.

Based on soil and site evaluation the site can be classified as **provisionally suitable to suitable** and may be utilized for septic systems consistent with the Rules.

## CRITERIA FOR CONVENTIONAL SEPTIC SYSTEMS

For one 4-bedroom system, the design flow is 480 gallons per day (gpd). When the design flow is divided by the LTAR (0.3), the area of trench bottom can be calculated, which is 1600 ft<sup>2</sup>. The total length of trenches can be calculated by dividing the trench bottom area by 3 feet (which is

the maximum trench width). Using these calculations, a 4-bedroom home would need 533 linear feet of trench.

Septic lines are laid on contour 9 feet apart from the center. The minimum area needed is 4,800ft<sup>2</sup>. This area assumes even linear slope with parallel septic lines. Additionally, septic systems need a designated repair area. At a minimum there needs to be approximately 8,400 ft<sup>2</sup> for both the initial and repair area. This area can be reduced by using approved systems that allow for a 25% reduction in trench length.

The required area for five 4-bedroom systems, using the above calculations, would be approximately 42,000 ft<sup>2</sup>.

Other required horizontal setbacks (wells etc.,) were not considered in the soil that could be used for a conventional system. These setbacks will affect the overall area that can be used.

## CONCLUSIONS

Landscape position was the limiting factor at the site. There is approximately 276,000 ft<sup>2</sup> of suitable area. Only one boring (B7) was shallow to saprolite, and this area may require a shallow placed system. Overall, the site can be classified as provisionally suitable to suitable for a conventional septic system.

Based on the LTAR it is estimated that the required area for a 4-bedroom home would be approximately 8,400 ft<sup>2</sup>. The use of an accepted system would reduce the area by 25%. The exact location of the systems and potential layouts as well as house locations and horizontal setbacks, except for property line, were not calculated or defined. The required area for five 4-bedroom systems would be approximately 42,000 ft<sup>2</sup>.

The findings presented herein represent Soil and Septic Solutions' site and soils evaluation and knowledge of the current laws and regulations governing on-site wastewater systems in North Carolina (Section .1900 of the North Carolina Administrative Code).

It is Soil & Septic Solutions' professional opinion that this lot can be used for residential development and has enough suitable soil for three to five septic systems. Any concurrence with the findings of this report would be made during the County's site evaluation. Additionally, do not clear or grub any land until the County has granted the appropriate approvals.

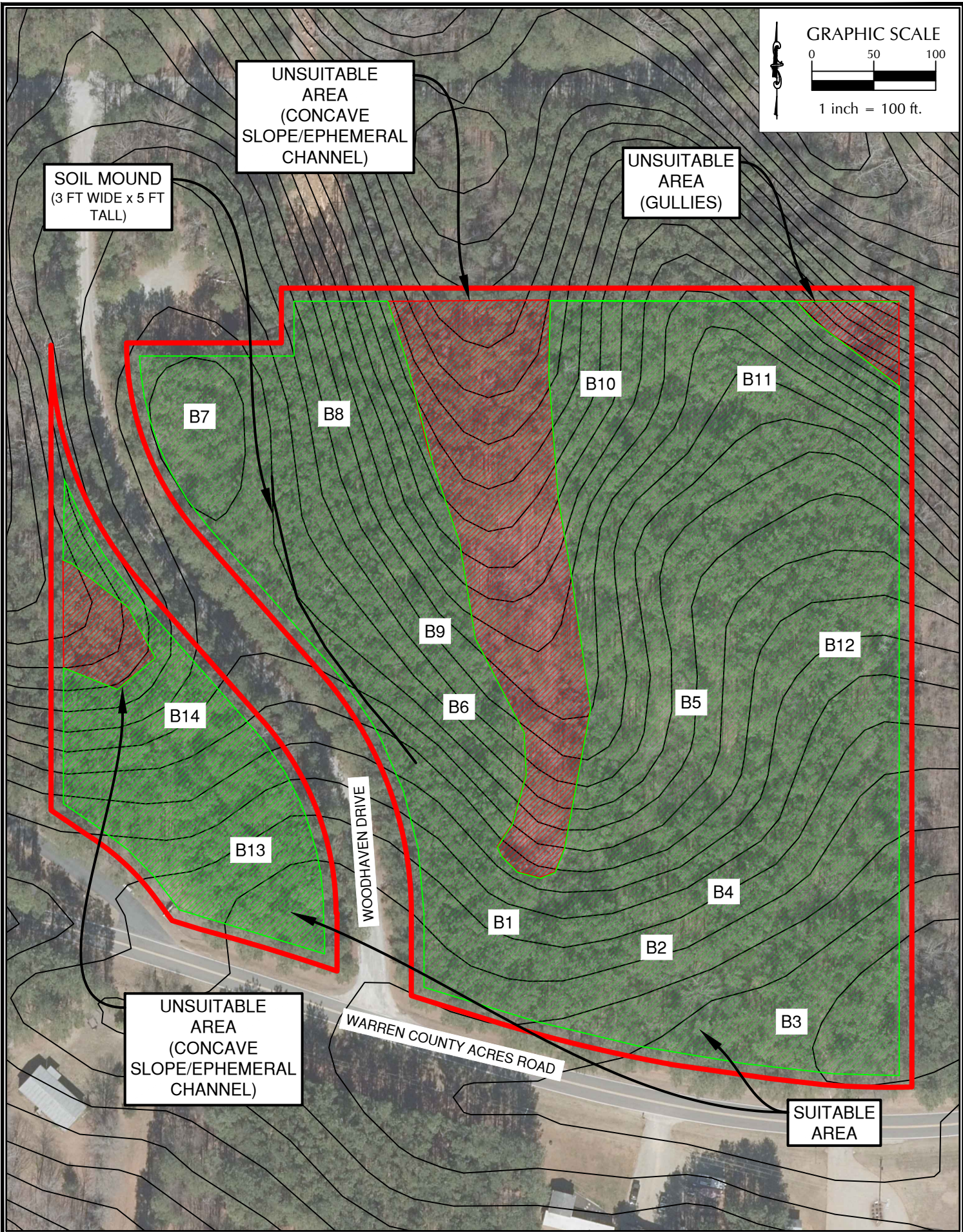
Sincerely,



Attachments:

1. Soil Boring Locations Exhibit
2. Soil Boring Logs







**SOIL/SITE EVALUATION**  
**for ON-SITE WASTEWATER SYSTEM**  
 (Complete all fields in full)

OWNER: \_\_\_\_\_ APPLICATION DATE: \_\_\_\_\_  
 ADDRESS: \_\_\_\_\_ DATE EVALUATED: 7/8/23  
 PROPOSED FACILITY: 3-5 (4 BDR) PROPOSED DESIGN FLOW (.1949): \_\_\_\_\_ PROPERTY SIZE: 10.47  
 LOCATION OF SITE: Warren County Acres Rd PROPERTY RECORDED: \_\_\_\_\_

WATER SUPPLY:  Private  Public  Well  Spring  Other \_\_\_\_\_  
 EVALUATION METHOD:  Auger Boring  Pit  Cut TYPE OF WASTEWATER:  Sewage  Industrial Process  Mixed

P R O F I L E  #	.1940 LANDSCAPE POSITION/ SLOPE %	HORIZON DEPTH (IN.)	SOIL MORPHOLOGY (.1941)		OTHER PROFILE FACTORS				PROFILE CLASS & LTAR
			.1941 STRUCTURE/ TEXTURE	.1941 CONSISTENCE/ MINERALOGY	.1942 SOIL WETNESS/ COLOR	.1943 SOIL DEPTH	.1956 SAPRO CLASS	.1944 RESTR HORIZ	
1	L 3-5%	0-20	SBK/SCL	FR/SS/SP/SEXP	5YR 4/6	S	-	-	S 0.3
		20-36	SBK/CL	FI/SS/SP/SEXP	2.5YR 4/6 "				
		36-48	SBK/SCL	FR/SS/SP/SEXP					
2	L 3-5%	0-10	SBK/SCL	FR/SS/SP/SEXP	5YR 4/6	PS	S	-	PS 0.3
		10-24	SBK/C	FI/SS/SP/SEXP	2.5YR 4/6				
		24-36	SBK/SiCL	FR/SS/SP/SEXP	"				
		36-48	M/SiL	FR/SS/SP/SEXP	"				
3	L 2%	0-24	SBK/SCL	FR/SS/SP/SEXP	5YR 4/6	PS	UN	-	PS 0.3
		24-36	SBK/SCL	FI/SS/SP/SEXP	2.5YR 4/6				
		36+	M/SiCL	FR/SS/SP/SEXOP	"				
4	L 5-10%	0-33	SBK/CL	FI/SS/SP/SEXP	5YR 4/6	PS	-	-	PS 0.3 WITH SHALLOW SYSTEM
		33-AR							

DESCRIPTION	INITIAL SYSTEM	REPAIR SYSTEM	OTHER FACTORS (.1946): _____
Available Space (.1945)	YES	YES	SITE CLASSIFICATION (.1948): <u>PS TO S DEPENDING ON LOCATION</u>
System Type(s)	GRAVEL OR ACCEPTED STATUS		EVALUATED BY: <u>GARY KREISER</u>
Site LTAR	0.3	0.3	OTHER(S) PRESENT: _____

COMMENTS: \_\_\_\_\_

# LEGEND

*use the following standard abbreviations*

LANDSCAPE POSITION	GROUP	SOIL	CONVENTIONAL	LPP	MINERALOGY/	STRUCTURE
		TEXTURE	.1955 LTAR*	.1957 LTAR*	CONSISTENCE	
CC (Concave Slope)	I	S (Sand)	1.2 - 0.8	0.6 - 0.4	SEXP (Slightly Expansive)	G (Single Grain)
CV (Convex Slope)		LS (Loamy Sand)			EXP (Expansive)	M (Massive)
D (Drainage Way)	II	SL (Sandy Loam)	0.8 - 0.6	0.4 - 0.3		CR (Crumb)
DS (Debris Slump)		L (Loam)				GR (Granular)
FP (Flood Plain)	III	Si (Silt)	0.6 - 0.3	0.3 - 0.15		SBK (Subangular Blocky)
FS (Foot Slope)		SiCL (Silty Clay Loam)				ABK (Angular Blocky)
H (Head Slope)		CL (Clay Loam)				PL (Platy)
L (Linear Slope)		SCL (Sandy Clay Loam)				PR (Prismatic)
N (Nose Slope)		SiL (Silt Loam)				
R (Ridge)	IV	SC (Sandy Clay)	0.4 - 0.1	0.2 - 0.05		
S (Shoulder Slope)		SiC (Silty Clay)				
T (Terrace)		C (Clay)				
		O (Organic)			None	None

**MOIST**

**WET**

VFR (Very Friable)  
 FR (Friable)  
 FI (Firm)  
 VFI (Very Firm v. Very Sticky)  
 EFI (Extremely Firm)

NS (Non-sticky)  
 SS (Slightly Sticky)  
 S (Sticky)  
 VS (Very Sticky)  
 NP (Non-plastic)  
 SP (Slightly Plastic)  
 P (Plastic)  
 VP (Very Plastic)

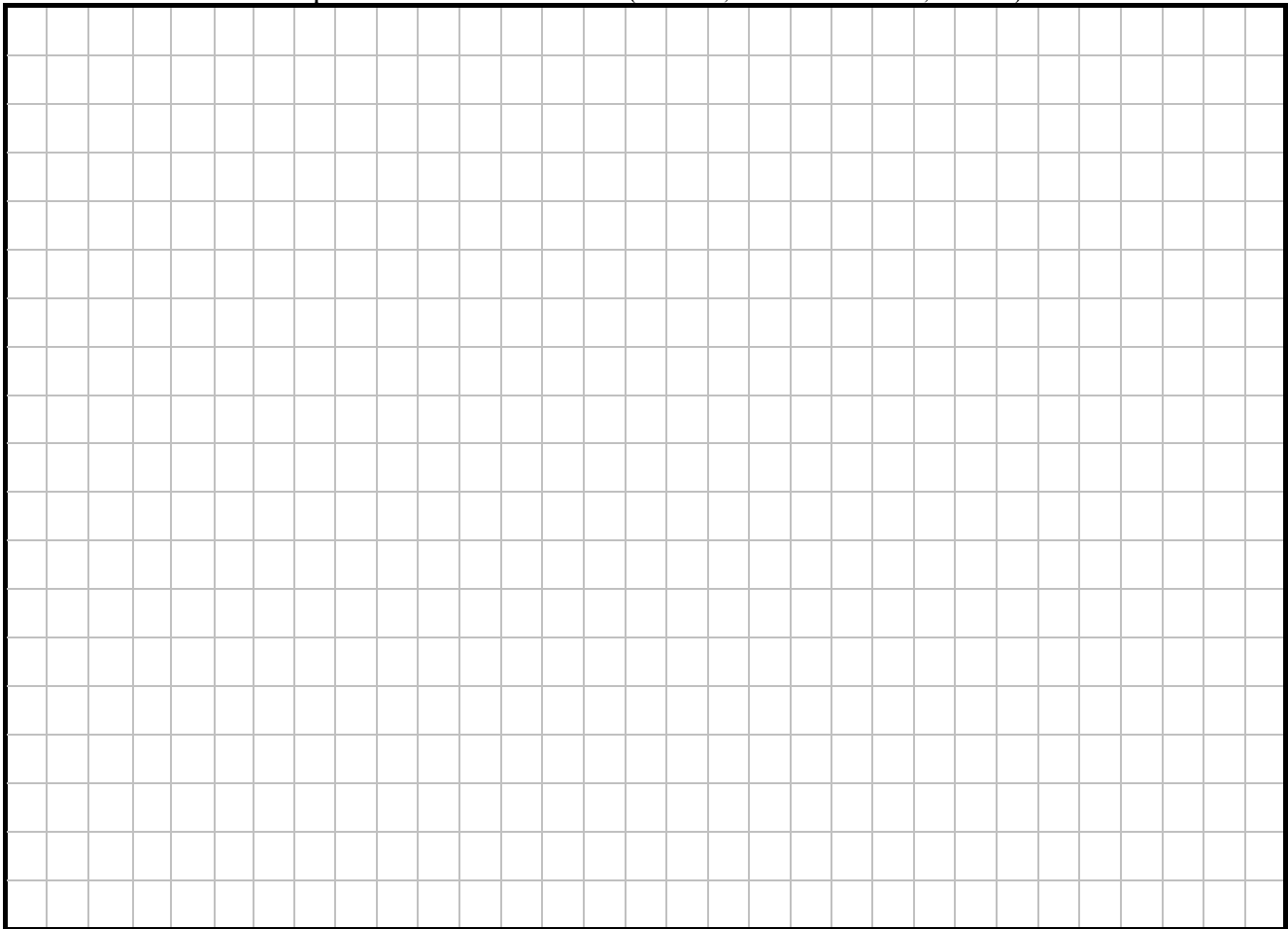
\*Adjust LTAR due to depth, consistence, structure, soil wetness, landscape, position, wastewater flow and quality.

**NOTES**

- HORIZON DEPTH** In inches below natural soil surface
- DEPTH OF FILL** In inches from land surface
- RESTRICTIVE HORIZON** Thickness and depth from land surface
- SAPROLITE** S(suitable) or U(unsuitable)
- SOIL WETNESS** Inches from land surface to free water or inches from land surface to soil colors with chroma 2 or less - record Munsell color chip designation
- CLASSIFICATION** S (Suitable), PS (Provisionally Suitable), or U (Unsuitable)

Evaluation of saprolite shall be by pits.  
 Long-term Acceptance Rate (LTAR): gal/day/ft<sup>2</sup>

**Show profile locations and other site features (dimensions, reference or benchmark, and North).**



**SOIL/SITE EVALUATION**  
(Continuation Sheet-Complete all field in full)

PROPERTY ID #: \_\_\_\_\_  
DATE OF EVALUATION: 7/8/23  
COUNTY: Warren

P R O F I L E  #	.1940 LANDSCAPE POSITION/ SLOPE %	HORIZ ON DEPTH (IN.)	SOIL MORPHOLOGY (.1941)		OTHER PROFILE FACTORS				PROFILE CLASS & LTAR
			.1941 STRUCTURE/ TEXTURE	.1941 CONSISTENCE/ MINERALOGY	.1942 SOIL WETNESS/ COLOR	.1943 SOIL DEPTH	.1956 SAPRO CLASS	.1944 RESTR HORIZ	
5	L 5-10%	0-30	SBK/C	FI/SS/SP/SEXP	5YR 4/6	PS	UN	-	PS 0.3
		30-40	SBK/SiCL	FR/SS/SP/SEXP	"				
		40+	M/SiCL	FR/SS/SP/SEXP	"				
6	L 5-10%	0-36	SBK/C	FI/SS/SP/SEXP	5YR 4/6	S	-	-	S 0.3
		36-48	SBK/SCL	FR/SS/SP/SEXP	"				
7	L 2%	0-26	SBK/CL	FI/SS/SP/SEXP	5 YR 4/6	UN	S	-	PS- 0.3 SHALLOW SYSTEM POSSIBLE SAPROLITE SYSTEM
		26+	M/SL	VFR/SS/SP/SEXP	"				
8	L 10%	0-16	SBK/SCL	FR/SS/SP/SEXP	2.5YR 4/6	S	-	-	S 0.3
		16-48	SBK/C	FI/SS/SP/SEXP	"				
9	L 10%	0-32	SBK/C	FI/SS/SP/SEXP	2.5YR 4/6	PS	UN	-	PS 0.3
		32-40	SBK/SiCL	FR/SS/SP/SEXP	"				
		40-48	M/SiCL	FR/SS/SP/SEXP	"				

COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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			.1941 STRUCTURE/ TEXTURE	.1941 CONSISTENCE/ MINERALOGY	.1942 SOIL WETNESS/ COLOR	.1943 SOIL DEPTH	.1956 SAPRO CLASS	.1944 RESTR HORIZ	
10	L 5%	0-26	SBK/C	FI/SS/SP/SEXP	2.5YR 4/6	PS	UN	-	PS 0.3
		26-38	SBK/SiCL	FR/SS/SP/SEXP	"				
		38-48	M/SiCL	FR/SS/SP/SEXP	"				
11	L 2%	0-16	SBK/SCL	FR/SS/SP/SEXP	2.5YR 4/6	PS	UN	-	PS 0.3
		16-26	SBK/C	FI/SS/SP/SEXP	"				
		26-36	SBK/SiCL	FR/SS/SP/SEXP	"				
		36+	M/SiCL	FR/SS/SP/SEXP	"				
12	L 3-5%	0-36	SBK/C	FI/SS/SP/SEXP	2.5YR 4/6	PS	-	-	PS 0.3
		36-40	SBK/SCL	FR/SS/SP/SEXP	"				
		40- AR							
13	L 3-5%	0-36+	SBK/C	FI/SS/SP/SEXP	2.5YR 4/6	PS	-	-	PS 0.3
14	L 5-10%	0-16	SBK/SCL	FR/SS/SP/SEXP	2.5YR 4/6	S	-	-	S 0.3
		16-48	SBK/C	FI/SS/SP/SEXP	"				

COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_