The Why & How of Soil Evaluation For Septic Systems In Glaciated Ohio: Wearing Many Hats

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Soil Research
Septic System Design

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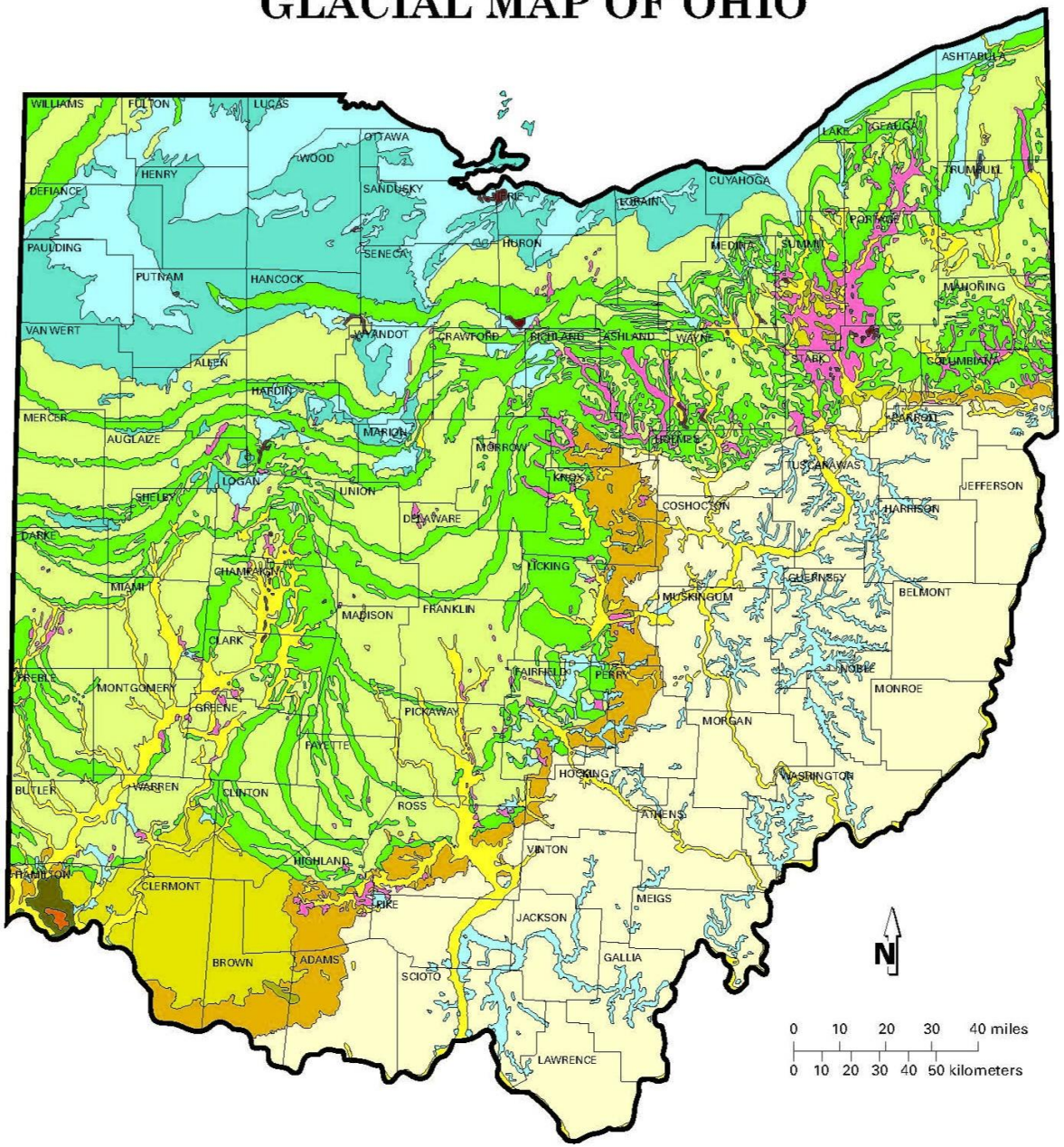
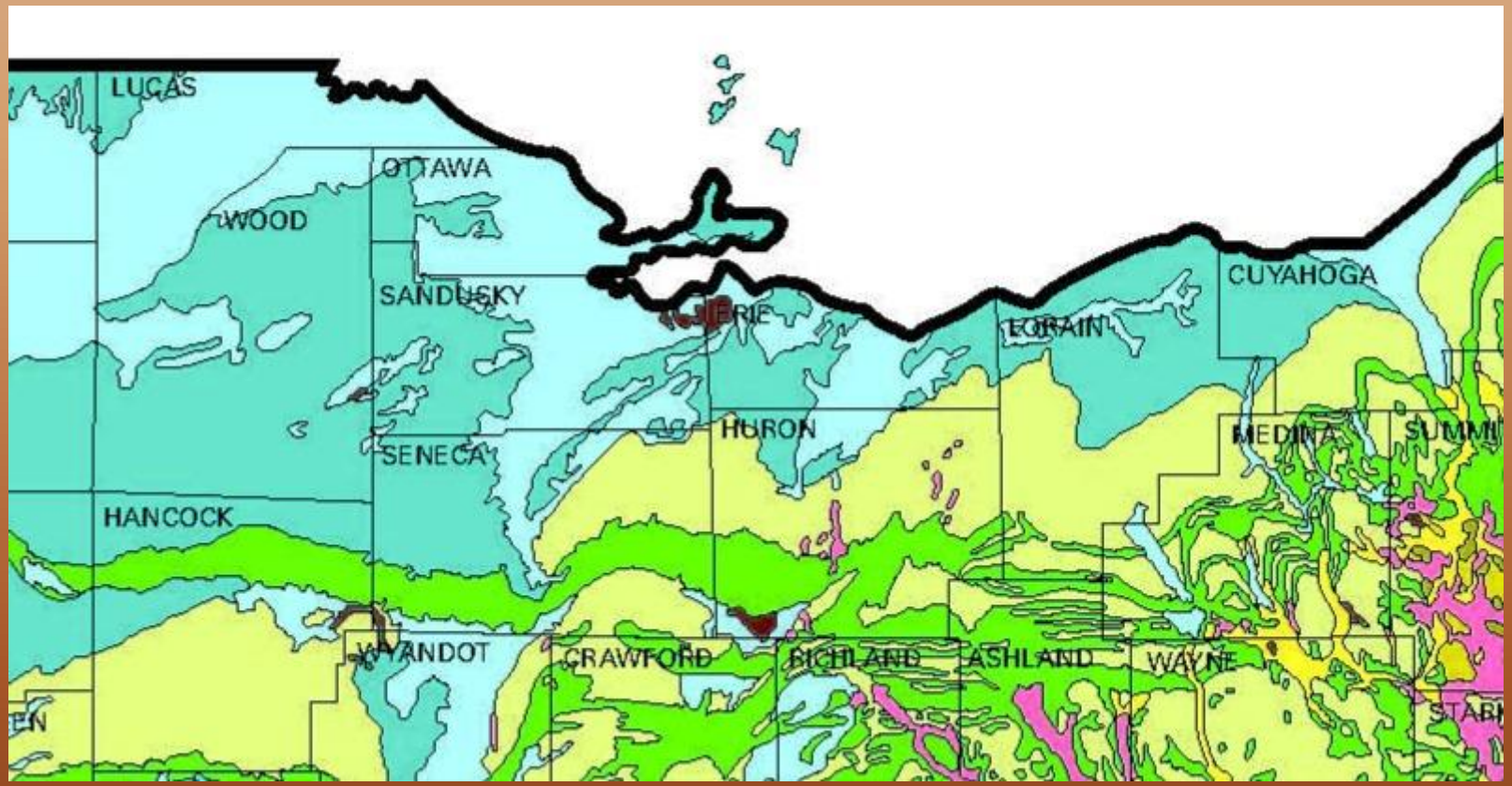
The information presented here are the views of Nathan Wright and Geophyta, Inc. and do NOT reflect the opinions of NOWRA

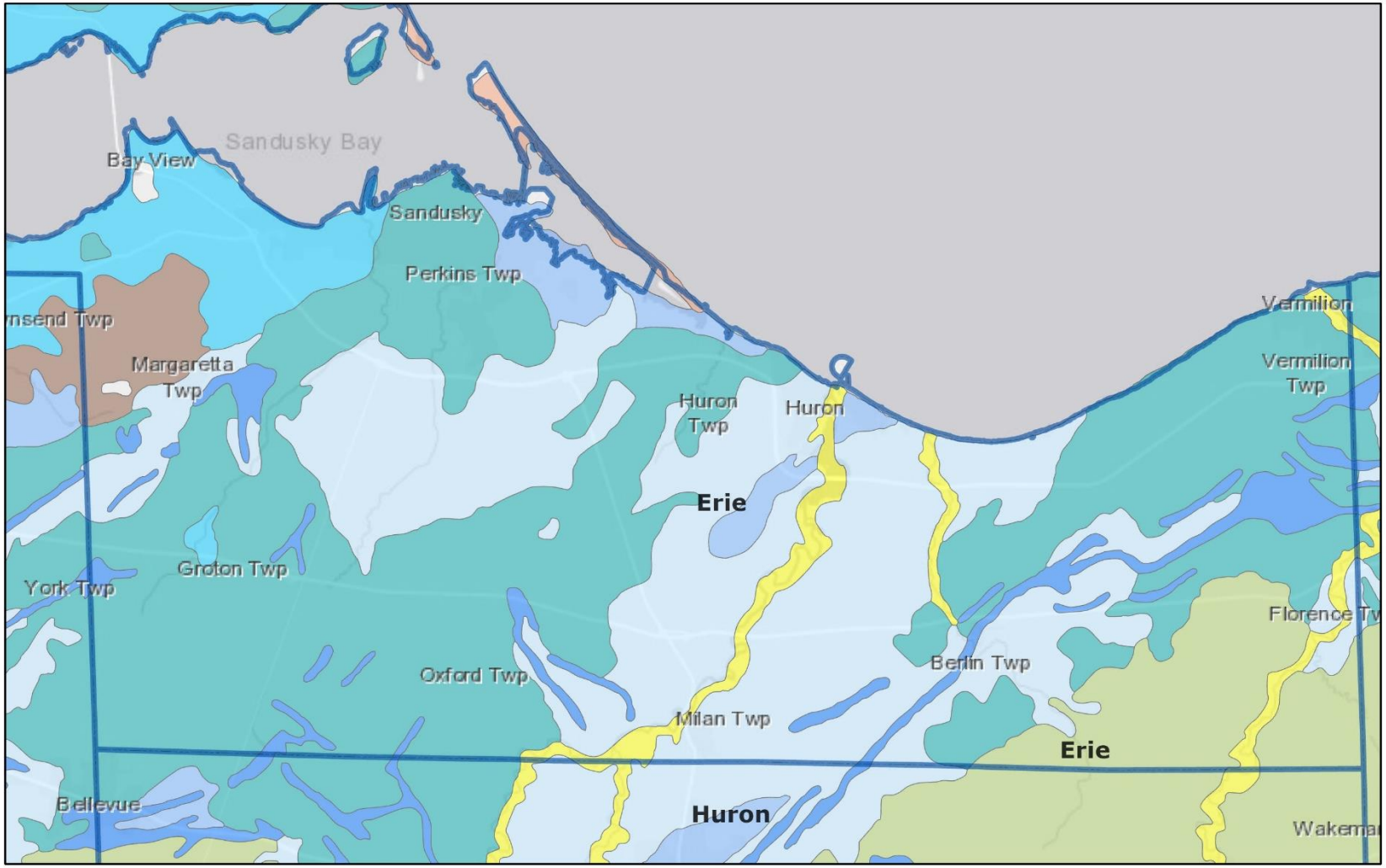
STATE OF OHIO • DEPARTMENT OF NATURAL RESOURCES • DIVISION OF GEOLOGICAL SURVEY

GLACIAL MAP OF OHIO




LUCAS
OTTAWA
WOOD
SANDUSKY
ERIE
CUYAHOGA
LORAIN
HURON
MEDINA
SUMMI
SENECA
HANCOCK
WYANDOT
CRAWFORD
RICHLAND
ASHLAND
WAYNE

Geology Map - Erie County Ohio



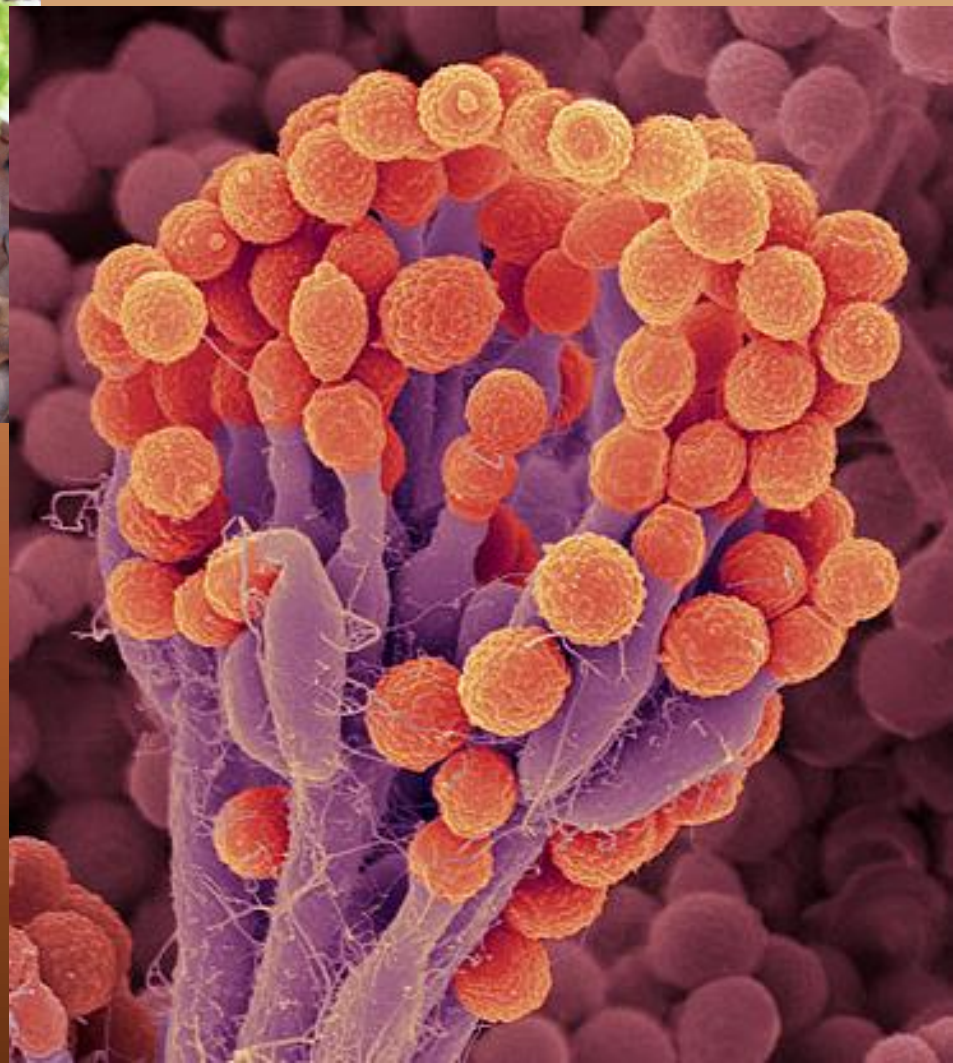

Why A Soils Based Approach?

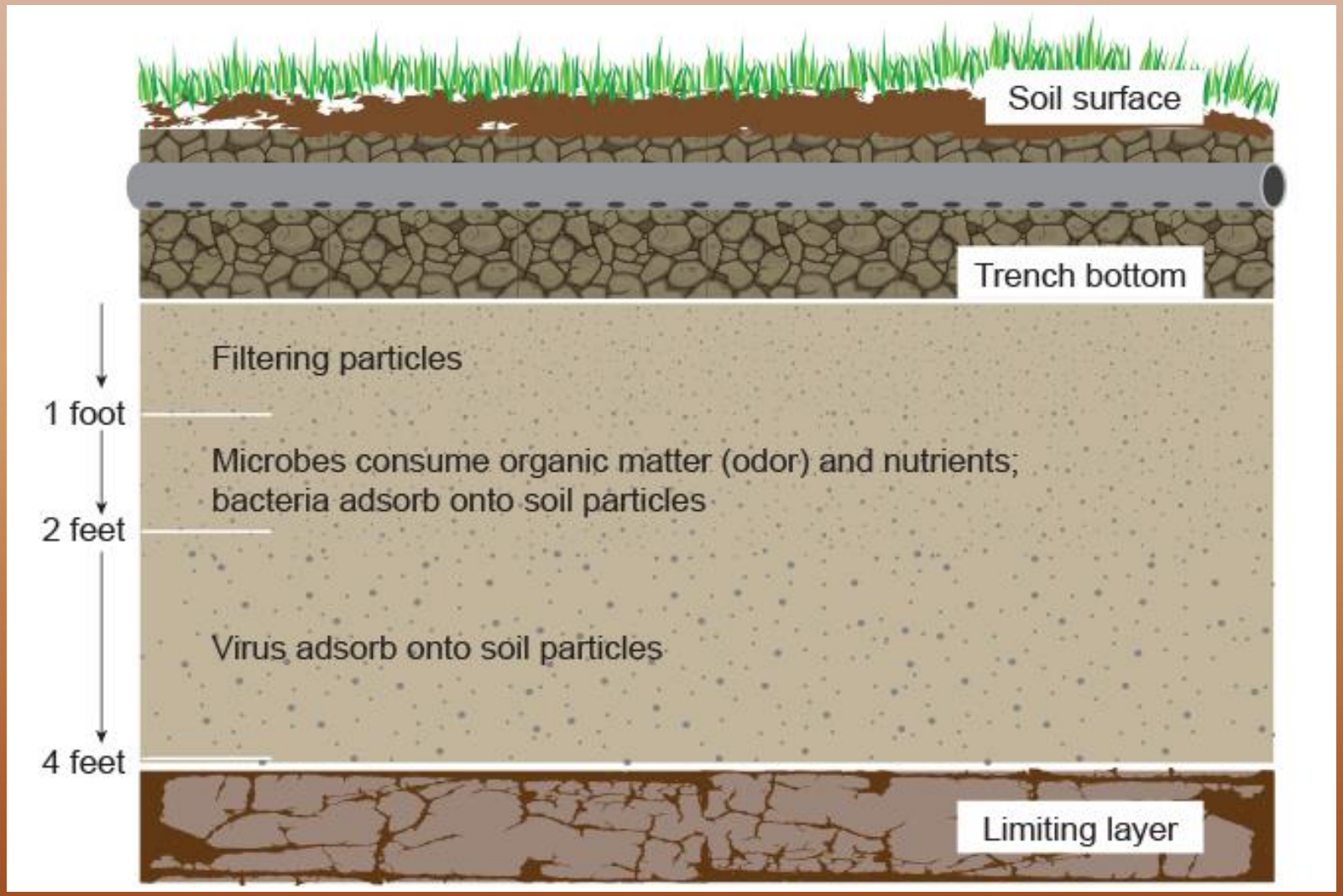

Soils Can “Clean Up” Septic Effluent

1 Teaspoon Soil

1,000,000,000 bacteria
100,000,000 actinomycetes
1,000,000 fungi

Source: Various





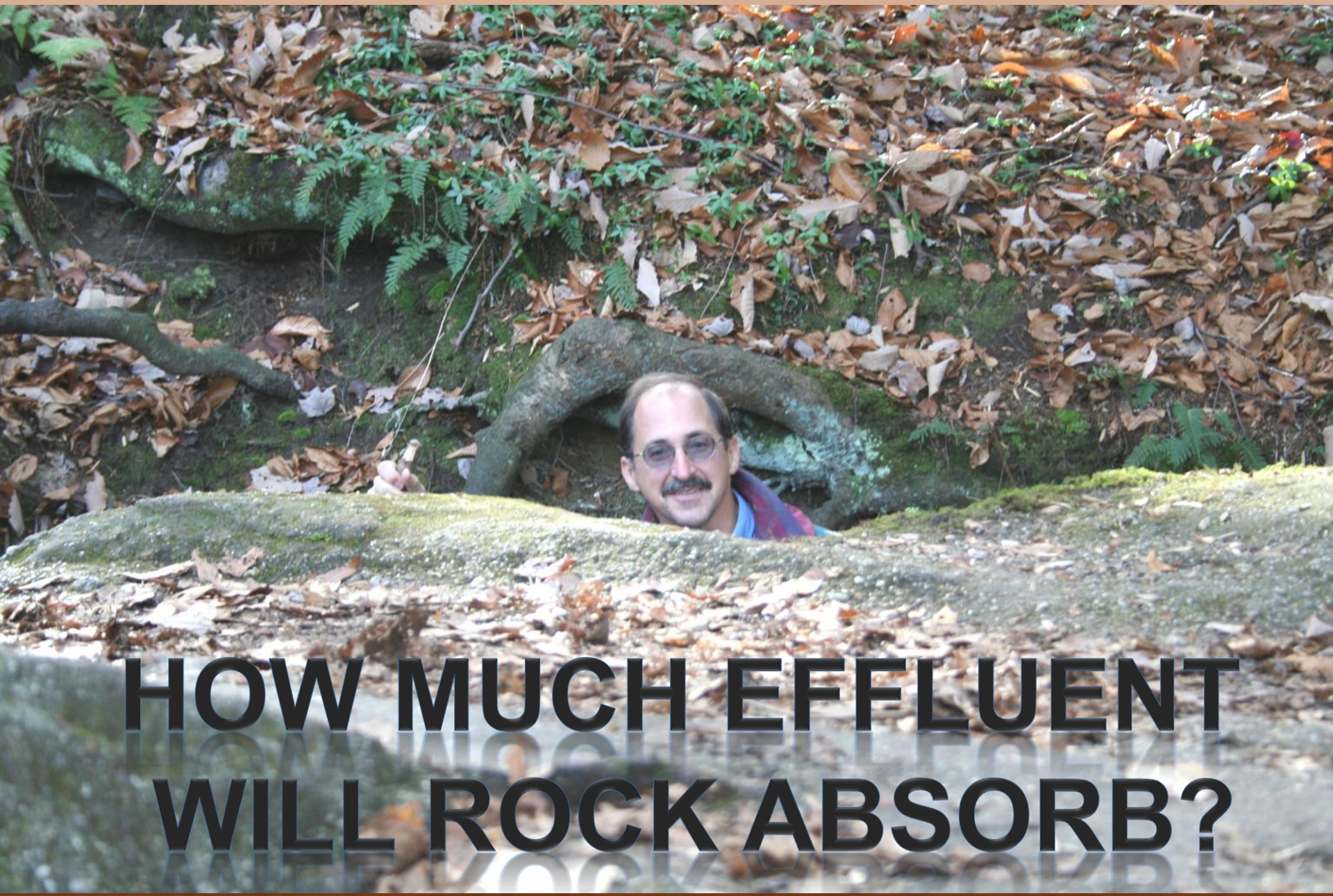
Mancl & Slater, 2016

Minimum Total Soil Depth Above Limiting Condition For “Adequate” Treatment = 2 Feet

Environmental. Health Goal: To Be "At One With Nature"

Some Common Treatment Limiting Conditions:

- Seasonal High Water Table
  (water saturated soil for 4 wks/yr.)
- Bedrock
- Soil Layers With >45% Clay
- Soil Layers With Very Firm Consistence
- Soil Layers With Very Coarse Sand
- Soil Layers With High Rock Fragments


HOW MUCH EFFLUENT
WILL ROCK ABSORB?

HOW MUCH EFFLUENT WILL GRAVEL ABSORB?


HOW MUCH EFFLUENT
WILL CLAY ABSORB?

HOW MUCH EFFLUENT WILL FILL ABSORB?

01.20.2015


11 ½ Feet
Of Fill
01.20.2015

Soil Sampling Methods

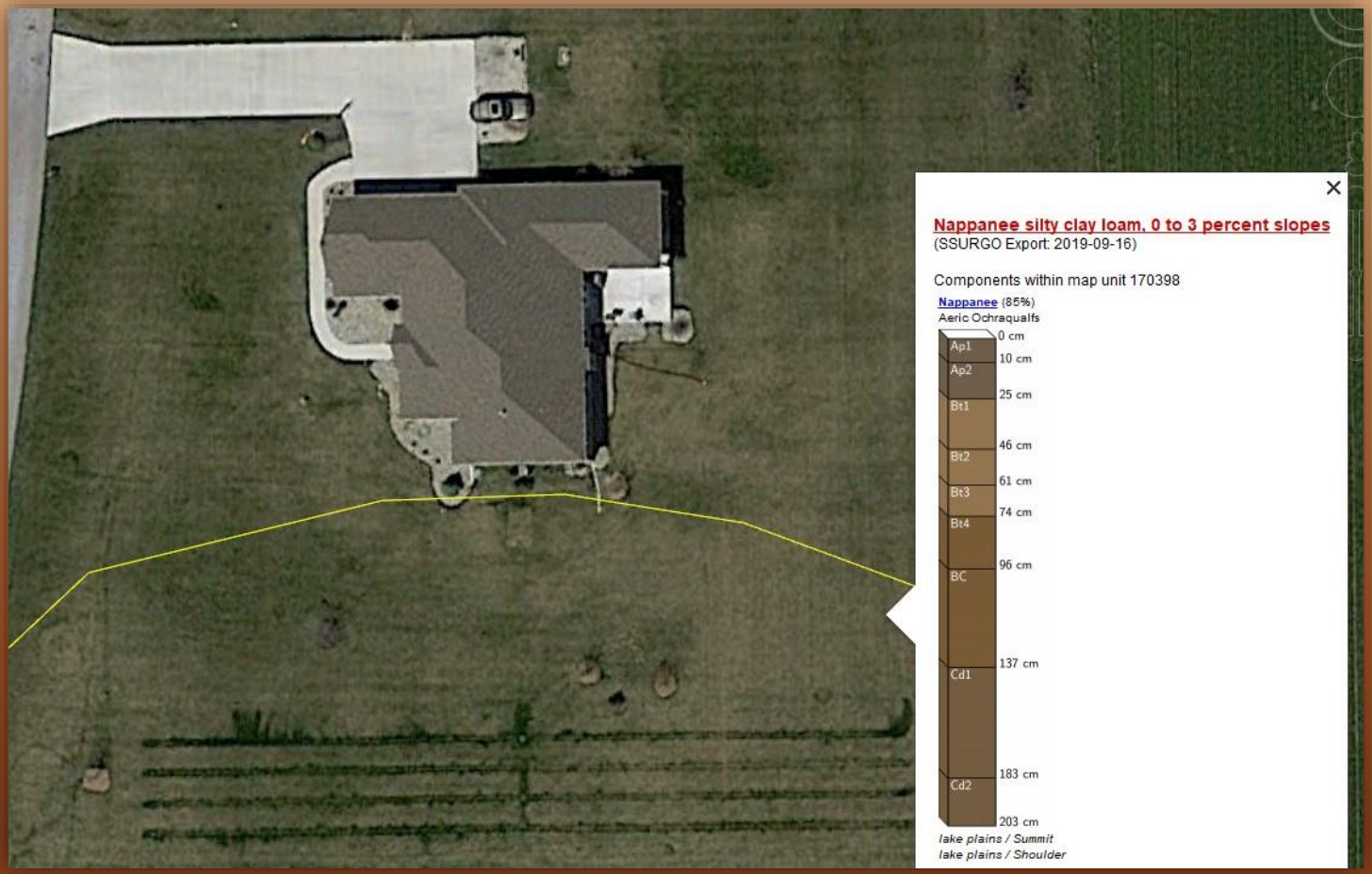
How we used to do it.

New And Improved Methods


WARNING!

Pre-Site Visit Tasks

Mapping – Historical Imagery



- April 2016

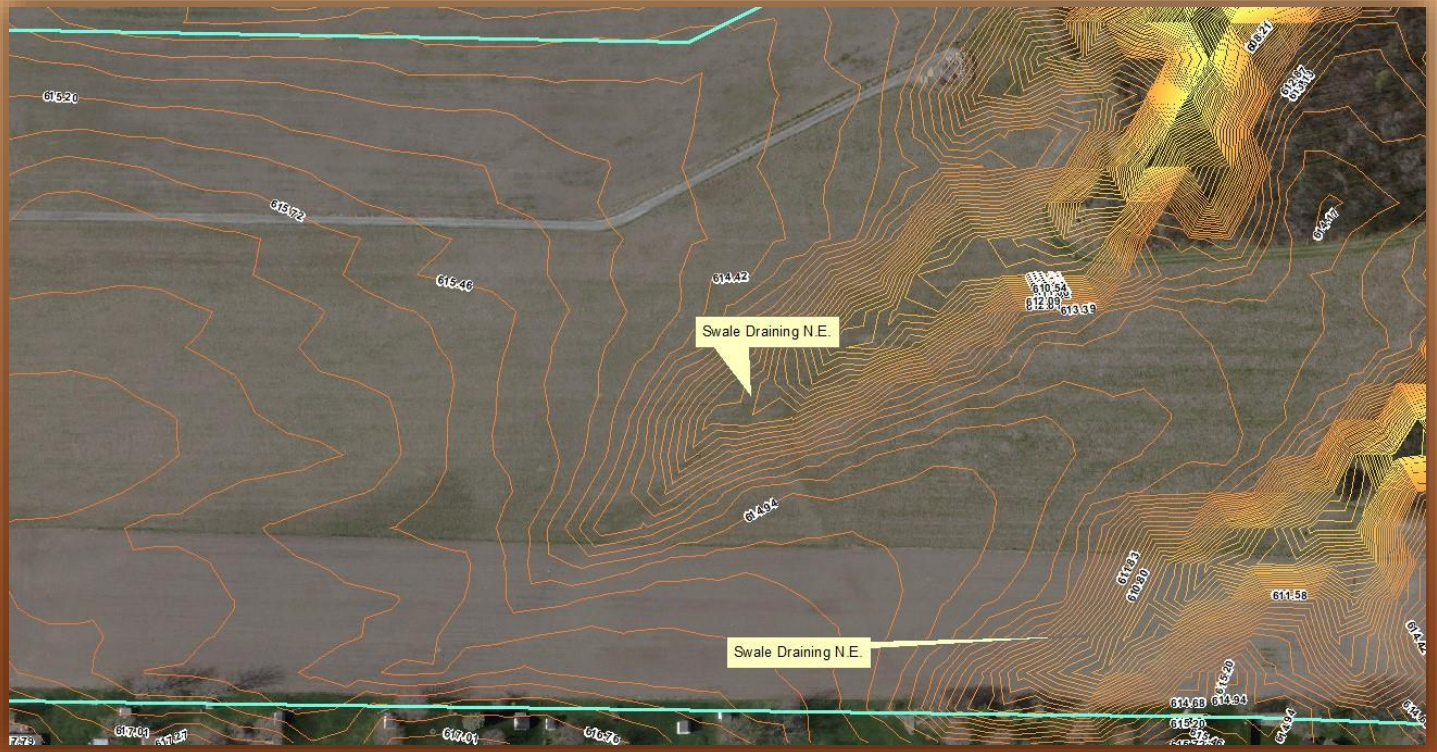
Mapping – Wetlands

OAC 3701-29-06

A STS soil absorption component shall be at least fifty feet from any surface water impoundment, lake, river, wetland, perennial stream, and road cut-banks or stream cut-banks

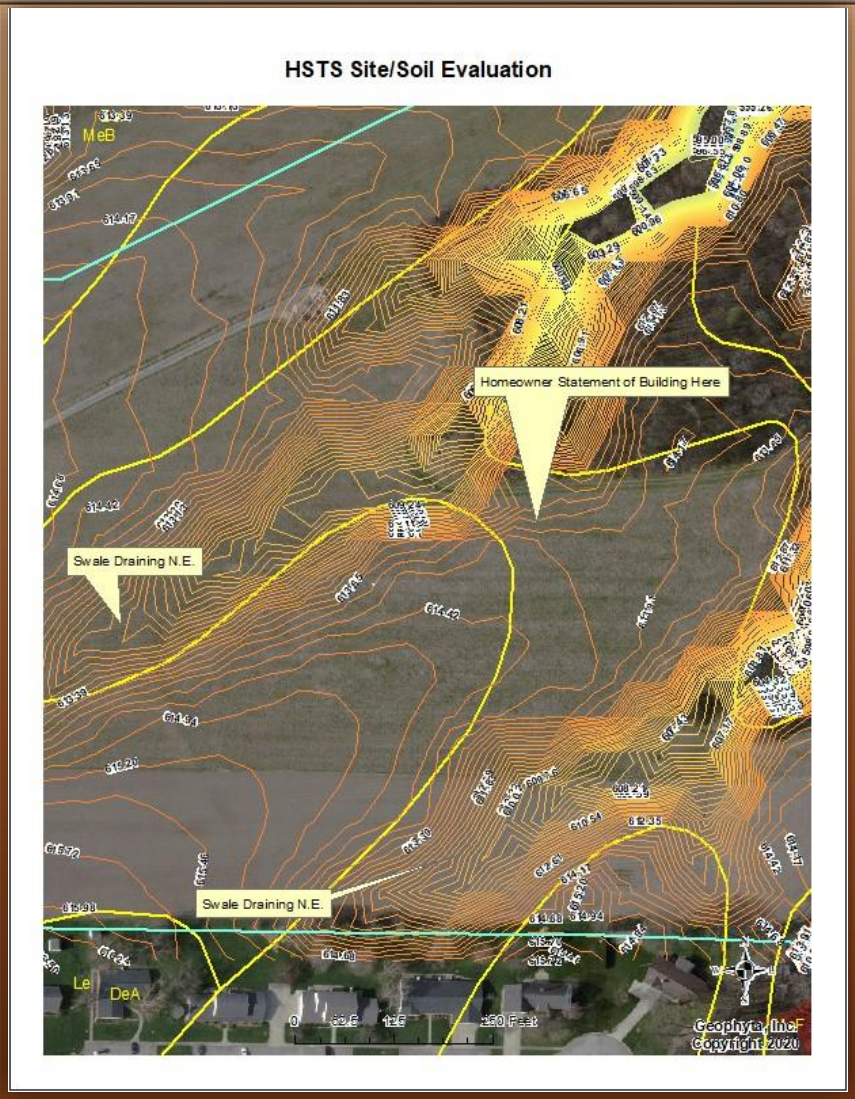
- In-House Mapping Software

Mapping – 3 Inch Elevation Contours

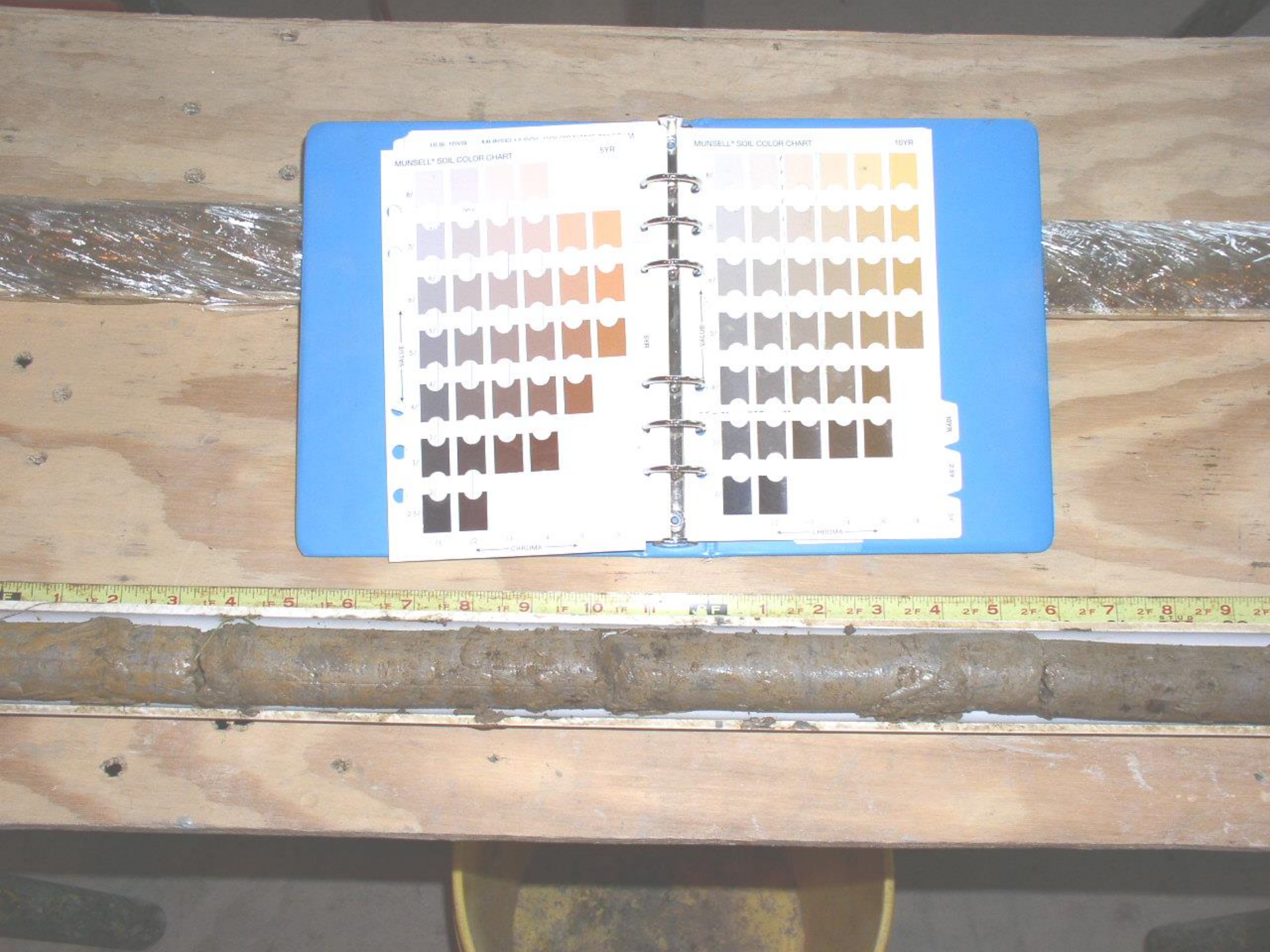


- In-House Mapping Software

Mapping – Final Map Before Site Evaluation



What We Look For In A Soil


MUNSELL® SOIL COLOR CHART
5YR
MUNSELL® SOIL COLOR CHART
10YR


1 2 3 4 25FT 5 6 7 8 9 10 11 1F 1F1
10 11 1F 1F1 1F2 1F3 1F4 1F5 1F6 1F7 1F8 1F9 1F10 1F11 2F 2F1 2F2
13 14 15 16 17 18 19 20 21 22 23 24 25 26
10 1F11 2F 2F1 2F2 2F3 2F4 2F5 2F6 2F7 2F8 2F9 2F10 2F11 3F 3F1 3F2
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
2F10 2F11 3F 3F1 3F2 3F3 3F4 3F5 3F6 3F7 3F8 3F9 3F10 3F11 4F
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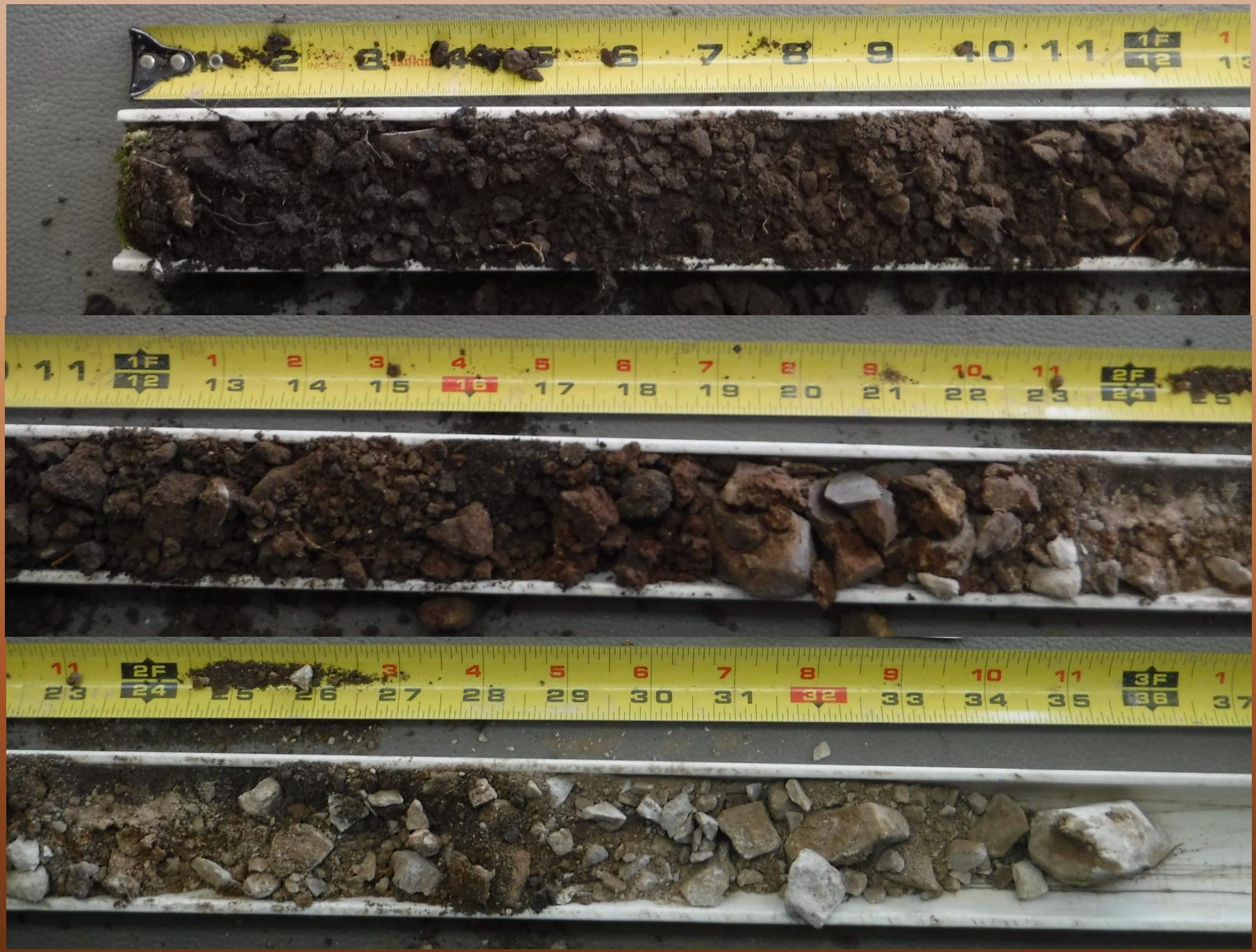
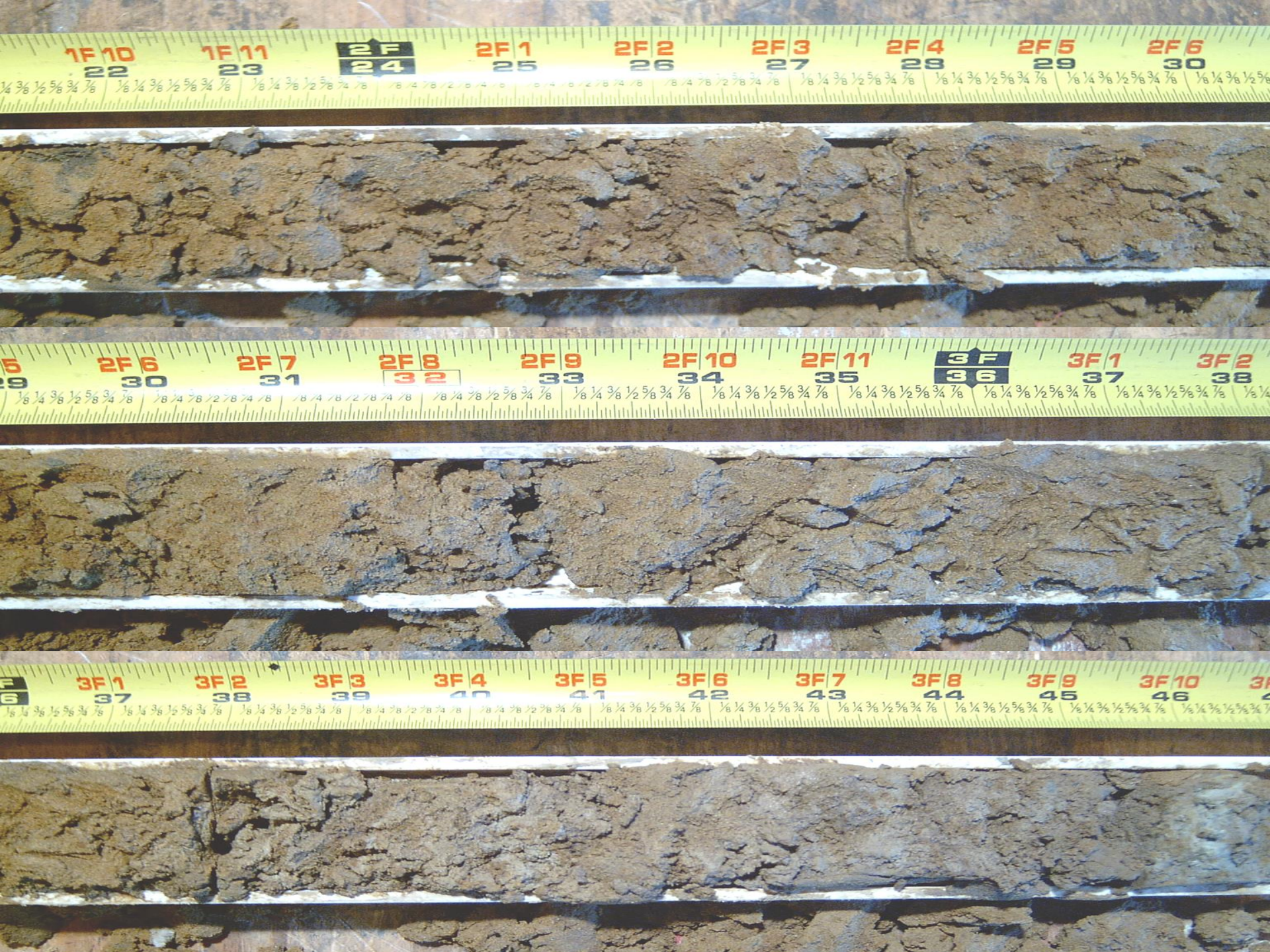



25FT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1F
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13
14
15

Site and Soil Evaluation for Sewage Treatment and Dispersal

County: Lorain
Township / Sec.: Brownhelm/Vermilion City
Property Address: [redacted]
OR Location: Parcel: [redacted]
Applicant Name: [redacted]
Address: [redacted]
Phone #:
Lot #:
Test Hole #: D
Latitude/Longitude: 82°19'35.555"W 41°24'45.348"N
Method: ____ Pit ___ Auger _X_ Probe; 1 1/4" dia.

Land Use / Vegetation: Legacy Agric. Row Crop
Landform: Glacial Lake Plain
Position on Landform: Flat
Percent Slope: 0-1
Shape of Slope: Linear - Linear

Date: 6-May-13
Evaluator: Nathan Wright
Geophyta, Inc.
2685 C.R. 254
Vickery, OH 43464
Phone#: 419-547-8538

CPSS Certified Professional Soil Scientist
Certification #: 19395
Signature: Nathan Wright

Soil Profile		Estimating Soil Saturation			Estimating Soil Permeability							
		Munsell Color (hue, value, chroma)										
			Redoximorphic Features		Texture			Structure				
Horizon	Depth (inches)	Matrix Color	Concentrations	Depletions	Class	Approx. % Clay	Approx. % Fragments	Grade	Size	Type (shape)	Consistence	Other Soil Features
A	0.0-7.0	10YR4/3	uniform	uniform	SiCL	30	0	2-mod	coarse	gr	friable	
B1t	7.0-9.0	10YR3/4	uniform	uniform	SiCL	35	0	2-mod	coarse	gr	friable	
B2t	9.0-14.0	10YR4/4	5%7.5YR4/6	15%10YR5/2	SiCL	40	0	2-mod	fine	sbk	friable	
Cg	14.0-32.0	10YR5/1	30%7.5YR4/6	matrix	SiC	45	0	1-weak	medium	sbk	firm	
R	32	-	-	-	-	-	-	-	-	-	-	soft shale layers

Limiting Conditions	Depth to (in.)	Descriptive Notes	Remarks / Risk Factors:
Perched Seasonal Water Table	9.0	Restricted in B2t & Cg	Tyler Table: A - B1t horizon (0.0 - 9.0) SiCL
Apparent Water Table	none		ILR(>30mg/L) = 0.4 gal/day/ft^2, ILR(<30mg/L) = 0.6 gal/day/ft^2
Highly Permeable Material	none		HLLR = 2.4 gal/day/ft
Bedrock	32.0	Soft shale layers	4 bedroom min. required absorption area = 1200 sq.ft.;
Restrictive Layer	14.0	SiC and weak structure	5xW Soil Absorption Box: 30'W x 200'L

Note : The evaluation shall include a complete site plan or site drawing including all requirements in paragraphs (B)(1) through (B)(4) of OAC 3701-29-08.

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B2t	9.0-14.0	10YR4/4	5%7.5YR4/6	15%10YR5/2	SiCL	40	0	2-mod	fine	sbk	friable	
Cg	14.0-32.0	10YR5/1	30%7.5YR4/6	matrix	SiC	45	0	1-weak	medium	sbk	firm	
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Diagnosis Of Failed Systems: A Type Of Archeology

Soil Sampling Of Old Septic Systems

Geophyta, Inc.

Soil Consulting

Soil Research

Septic System Design

THANK YOU