TNC: Lannon Farm Saturated Buffer

2019 Case Study

Properly evaluating the site saves a lot of headaches!

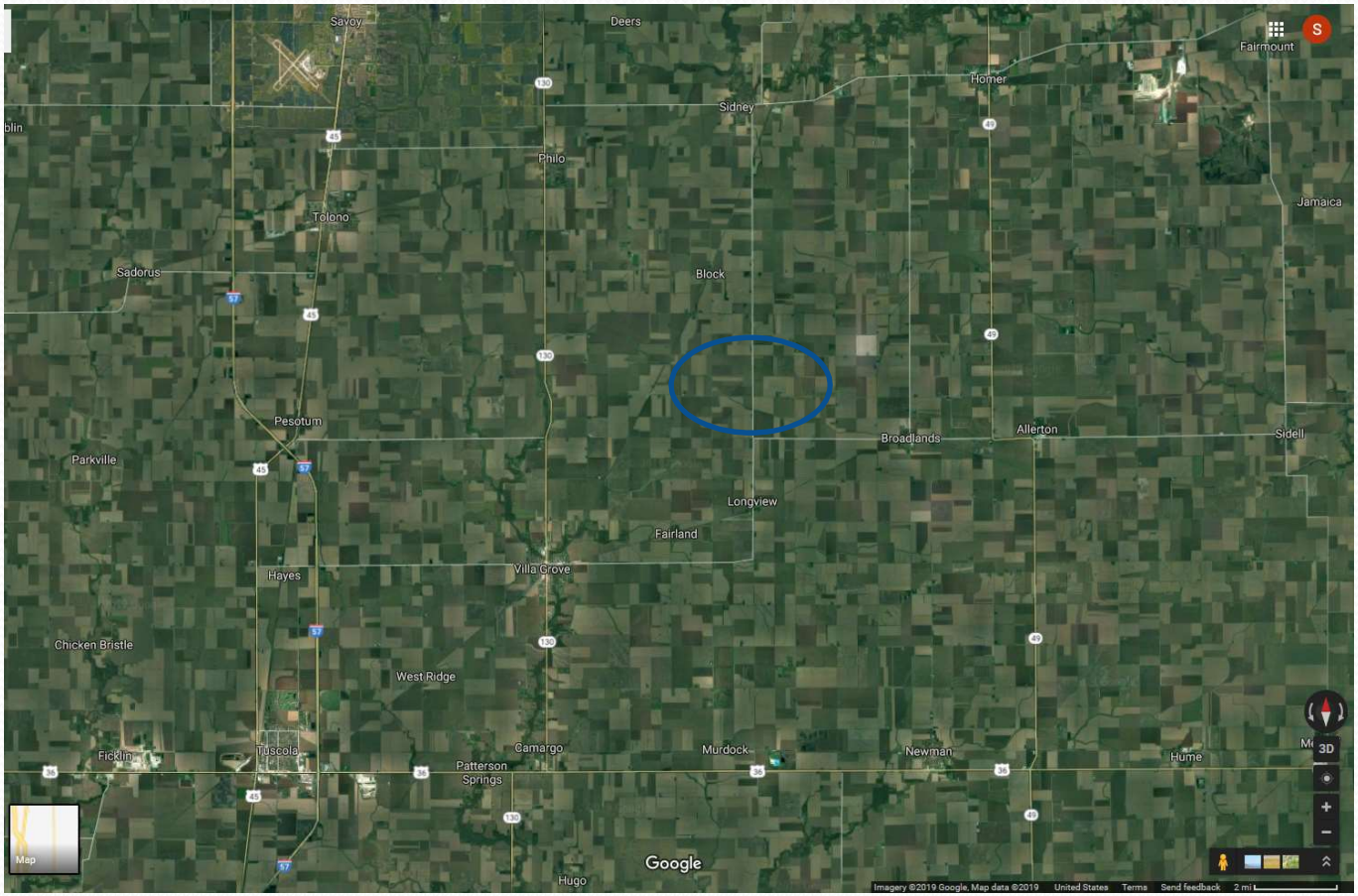
You need:

Enough OM

Saturated Soils

Stable streambanks

CLUE?



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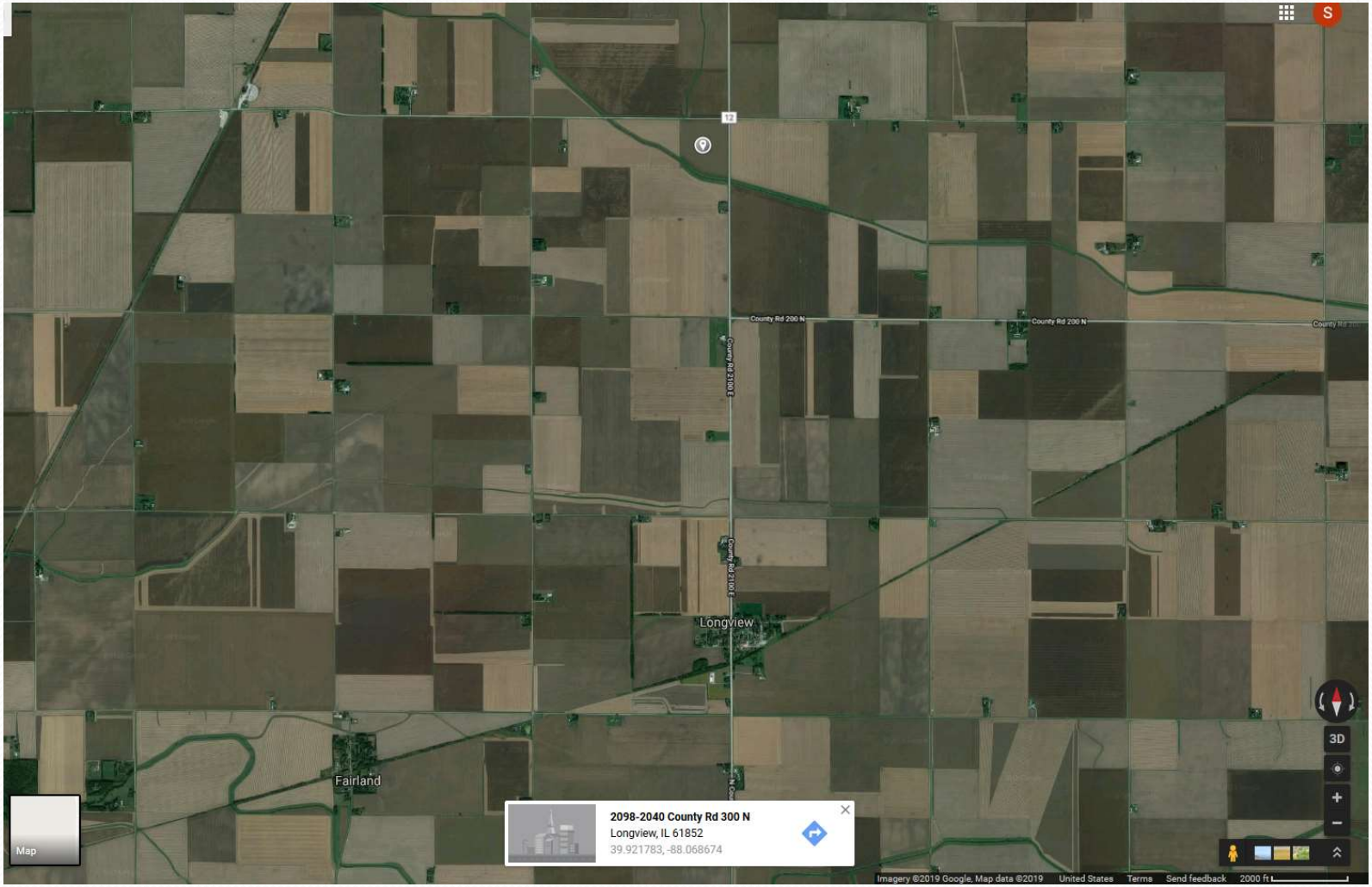

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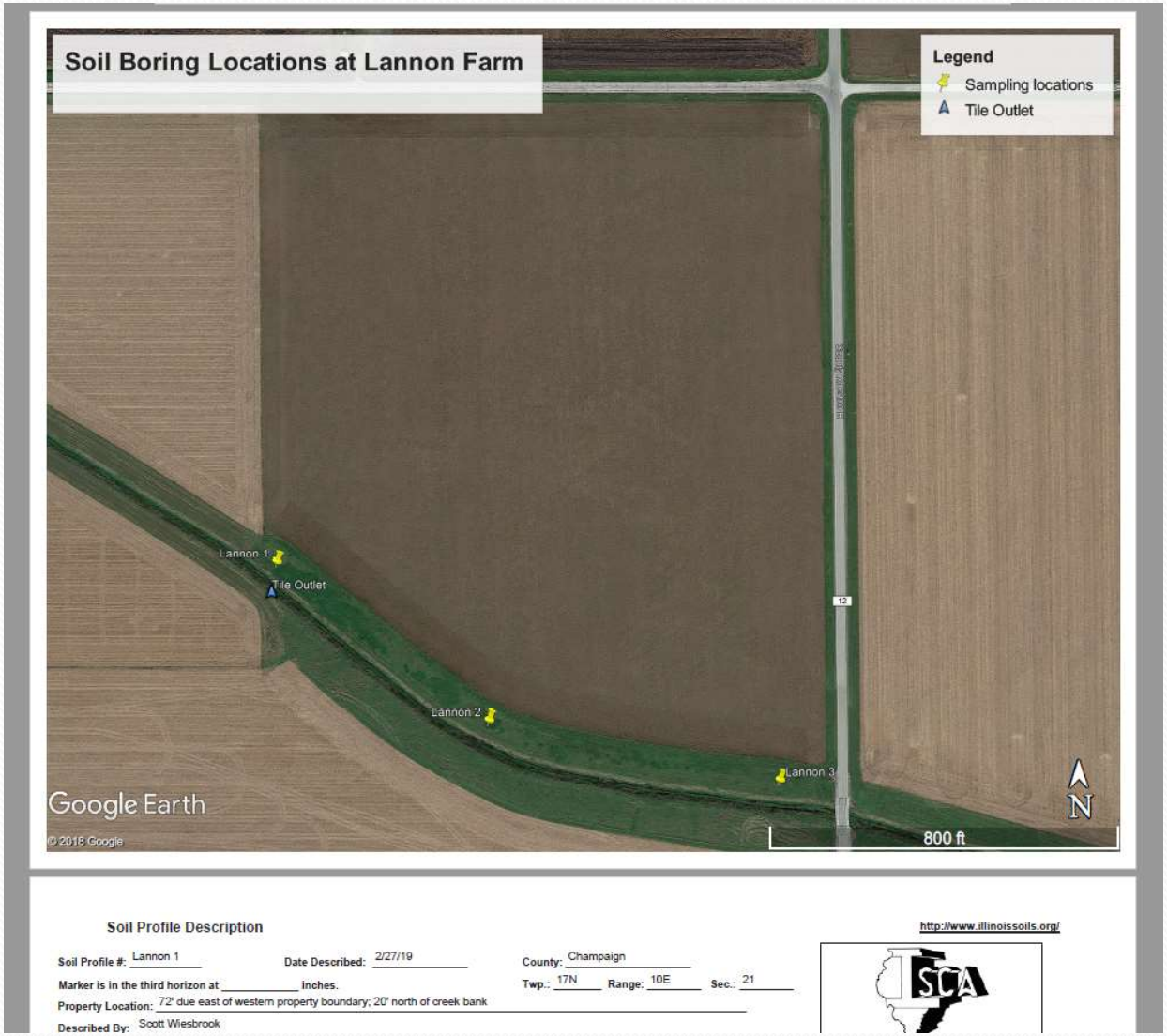

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When you don't have a soil scientist handy …

… you can probe your own soil core.

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What is ‘stable’?

Good

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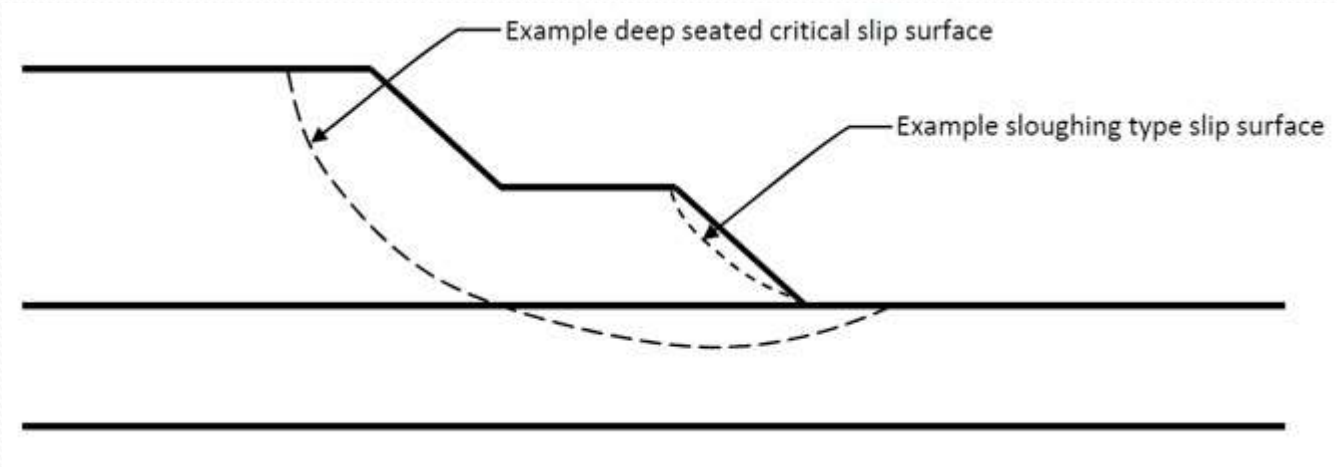
Good

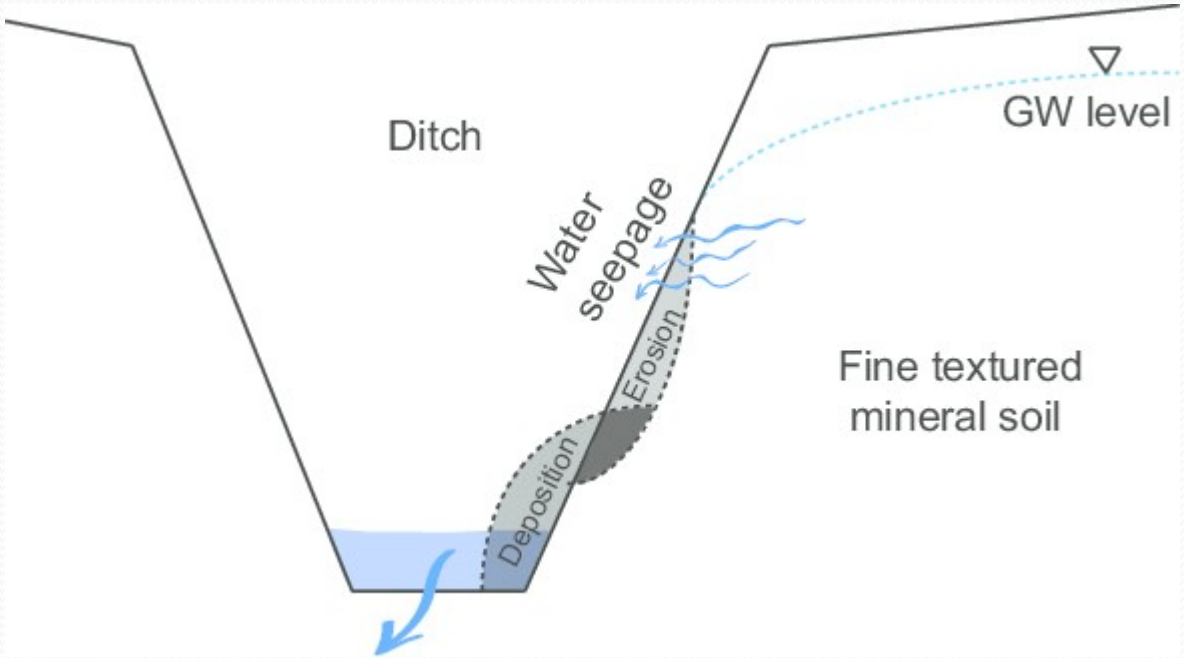
Bad

Bad

Why and How?


Example deep seated critical slip surface
Example sloughing type slip surface

Why and How?


Ditch
GW level
Water seepage
Erosion
Deposition
Fine textured mineral soil

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Design is a two-step process:

1. Determine System Capacity

2. Size Distribution Pipe

SATURATED BUFFER DESIGN

USDA- Natural Resources Conservation Service *Illinois NRCS Version 2.1 - 4/10/2017*

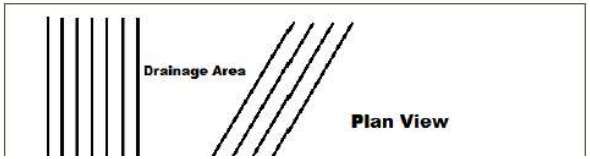
Project Name	TNC Saturated Buffer	**Designed by:**	SMA/WMS	**Date:**	5/24/2019
Site Location	Lannon	**Checked by:**		**Date:**	
County	Champaign				

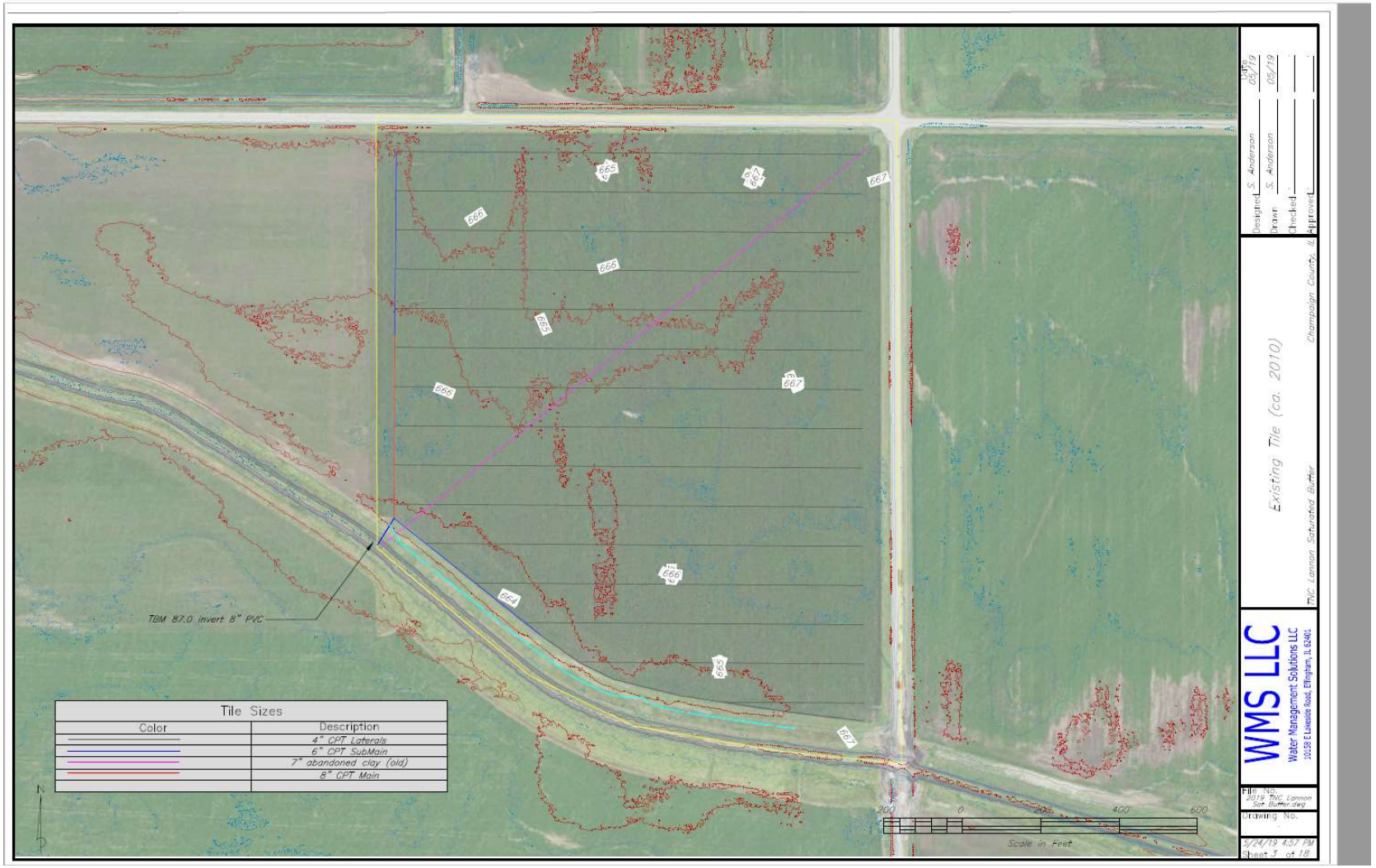
Determine System Capacity:

Option 1 - Mainline Configuration		Option 2 - Drainage Coefficient	
Mainline tile size (in)	8	Drainage area of tile system (ac)	46
Mainline tile grade (%)	0.50	Drainage coefficient (inches/day)	0.2
Mainline tile material	CPT	Capacity of drainage system	*0.387 cfs*
	Manning's 'n' = 0.016		
Peak velocity in mainline given size and grade	*1.99 ft/sec*	**Option 3 - Saturated Buffer system flow rate (Based on DRAINMOD Model or other source)**	
Peak flow from mainline size and grade	*0.696 cfs*	Describe Value Used and source	
Minimum Design Capacity: (5% of Option 1, 2, or 3; whichever is lower)	*0.019 cfs*		
Selected Design Capacity	0.020 cfs		

Size Distribution Pipe:

Distribution pipe min. grade (%)	0.05
Design distribution pipe diameter *(in)*	*6 in*
Distance from dist. pipe to outlet channel, L *(ft)*	40.0
Ground surface elevation at WCS *(ft)*	93.0
Depth of impervious layer *(ft)*	7.4





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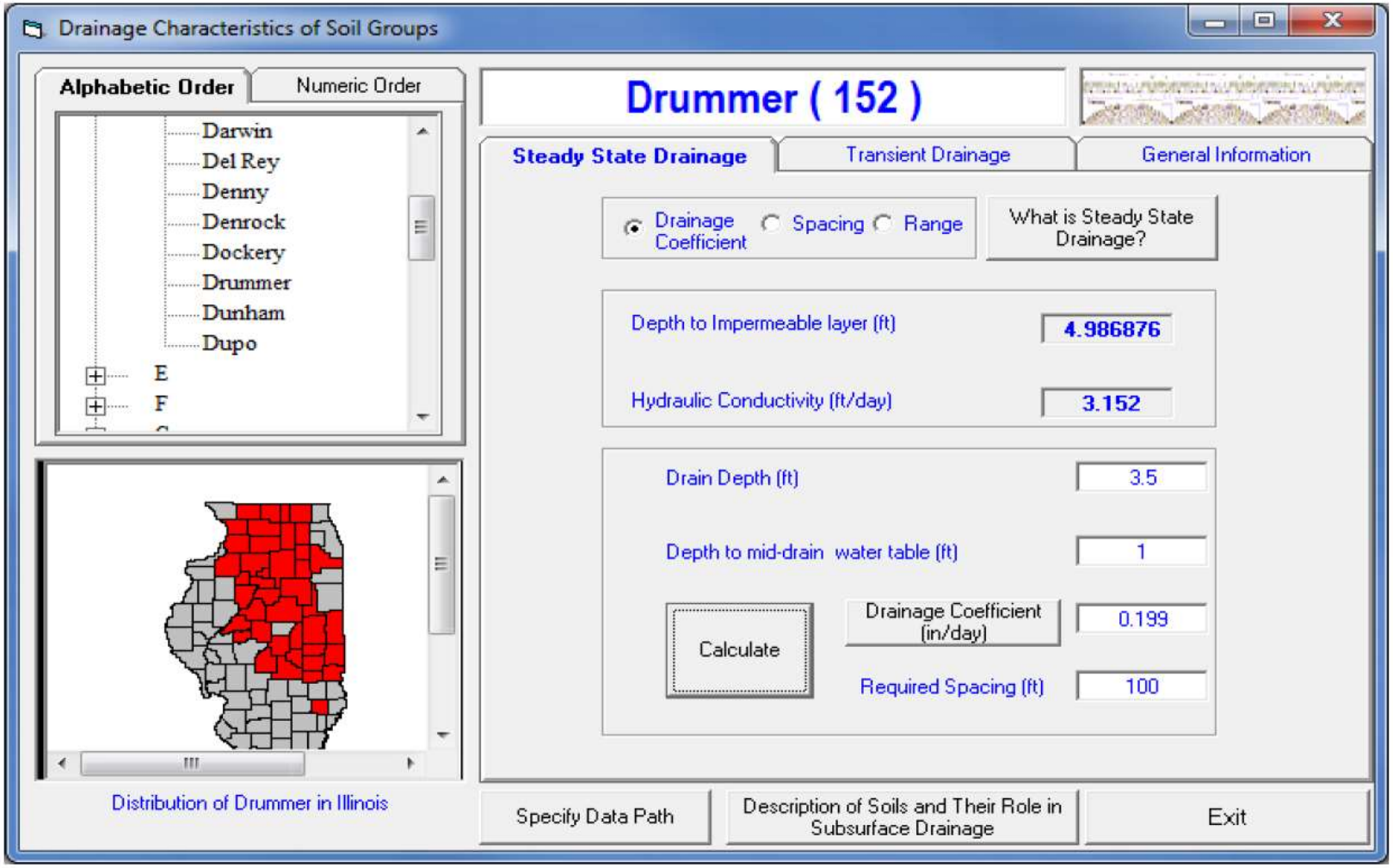

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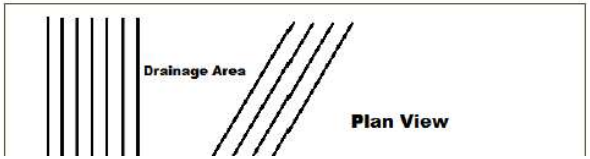

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TNC Lannon Farm ... | Soil Evaluation - La... | TNC Lannon Farm ...

2 / 5 135%

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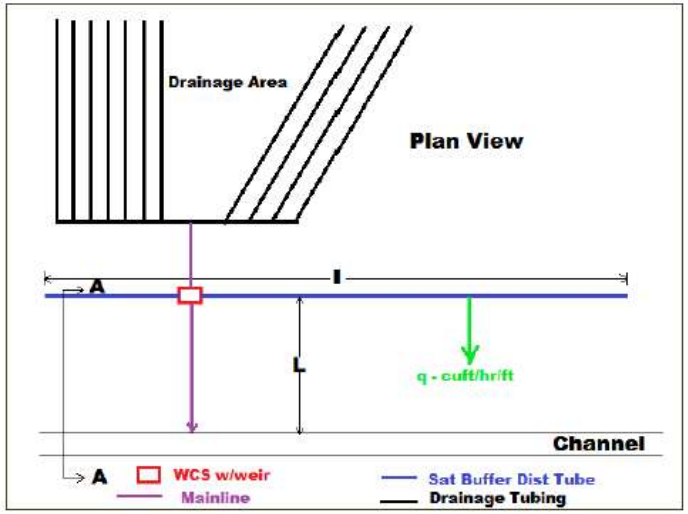
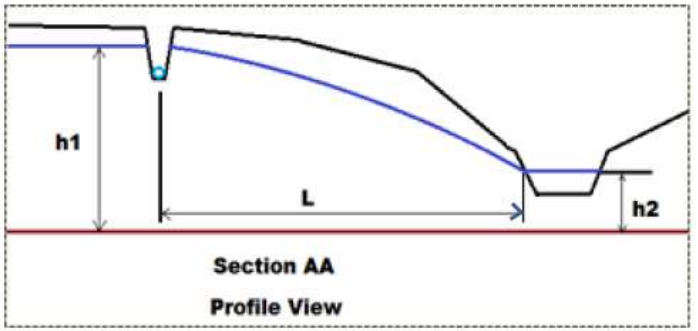
Depth of impervious layer *(ft)*	7.4
Design water control weir elevation *(ft)*	92.0
Baseflow water elevation in ditch or outlet *(ft)*	85.6
Head at WCS, h_1	*6.4 ft*
Head at outlet, h_2	*0.0 ft*
Soil saturated hydraulic conductivity, K_{sat} *(um/sec)*	9.70
	0.11 ft/hr
Unit flow from distribution pipe, q *(ft^3/hr per ft)*	*0.059*
$q = \frac{K_{sat}}{2L}(h_1^2 - h_2^2)$	
Distribution pipe length for min. design capacity	*1187 ft*
Selected distribution pipe length (ft)	1200
Distribution pipe flow rate *(ft^3/hr)*	*70.4*
% of drainage system capacity handled by saturated buffer design	*5.1%*





Notes:

Discussion?

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