

# Maryland Envirothon SOILS Exam

## Guidance Information

**Objective:** To test students' knowledge and awareness of basic soil science and its application in wise land-use planning and therefore conserving, protecting and enhancing the soil resource base. This is accomplished through a practical hands-on type of exam requiring the ability to make basic soil property observations, apply these observations to make suitability interpretations and the ability to use soil survey reports.

### Soils Exam Outline:

#### Section I. Soil and Surrounding Features (65 points)

##### Part A. Landscape Features (8 pts.)

1. Position (2 pts.)
2. Parent Material (2 pts.)
3. Slope Characteristics (2 pts.)
4. Surface Stoniness or Rockiness (2 pts.)

##### Part B. Soil Profile Features (31 pts.)

1. Major Soil Horizons (3 pts.)
2. Topsoil Layer - A horizon(s) thickness (2 pts.)
3. Soil Color and Munsell Soil Chart notation (2 pts.)
4. Soil Drainage (6 pts.)
5. Soil Depth (4 pts.)
6. Soil Texture (6 pts.)
7. Soil Permeability (4 pts.)
8. Soil Reaction - pH (2 pts.)
9. Past Soil Erosion (2 pts.)

##### Part C. Soil and Site Interpretations (26 pts.)

1. Agricultural Suitability (20 pts.)
  - a. Major Limiting Factors (2 pts.)
  - b. Land capability Class (3 pts.)
  - c. Prime Farmland (2 pts.)
  - d. Hydric Soil (2 pts.)
  - e. Potential Future Erosion (2 pts.)
  - f. Best Management Practices (4 pts.)
  - g. Nutrient Management (5 pts.)
2. Suitability for Septic tank Absorption Field (2pts.)
3. Suitability for Lawns and Golf Fairways (2 pts.)
4. Suitability for Playgrounds (2 pts.)

#### Section II. Soil Survey Use (22 pts.)

#### Section III. Fifth Issue Related to Soils (13 pts.)

## **Guidance to Soil Exam** (page number indicates location in Maryland Envirothon Soil Study Guide)

Section I. Soil and Surrounding Features - This section pertains to the exposed soil profile and the area to be evaluated as provided by the information sign or the pit proctor.

Part A. Landscape Features – based on area surrounding soil pit

1. Position (page 65) - requires understanding of kinds of landscape positions and the ability to differentiate in field.
  - **Upland:** usually level, rolling or convex, unaffected by stream activity
  - **Upland depression or drainage way:** concave landforms or at the heads of drainage ways, surface water retarded, sometimes ponded, usually thick dark surface (black), at least three sides are sloping to the bottom, parent material could be accumulated depositional material, may not be poorly drained.
  - **Terrace:** above zone of current flooding, usually gravel lines or coarse sands in profile, older alluvium parent material
  - **Floodplain:** near stream, floods, recent alluvium parent material
2. Parent Material (page 62) - requires knowledge of characteristics of 5 major types and ability to differentiate in field. Soil profiles may contain multiple types.
  - **Residual:** soils formed in place from bedrock (bedrock may not be present in profile)
  - **Colluvium:** generally located on lower part of slopes, moved down slope by gravity and water, soil material and angular coarse fragments, some maybe rounded.
  - **Glacial:** not found in Maryland
  - **Recent alluvium:** fresh or recent deposits, floodplain position or a depression with  $\geq 20$  inches depositional material, poorly developed profile in the recent alluvial material.
  - **Old alluvium:** water worn (rounded) coarse fragments in the soil profile, stream terrace position, should have a developed profile, never or rarely flooded, no fresh materials
  - **Coastal Plain sediments:** others on coastal plain region, can have silty cap (loess)
3. Slope Characteristics (page 67) - requires the ability to use clinometers or Abney levels to determine slope percentage and place in appropriate class based on physiographic province of the State. Guidance to appropriate physiographic province will be provided in training and/or by site proctor. The participant may need to know the exact percentage of slope for non-agricultural interpretations.

<u>SLOPE CLASS</u>	<u>COASTAL PLAIN</u>	<u>PIEDMONT OR MOUNTAIN</u>	<u>SOIL SURVEY LETTER SYMBOL</u>
Nearly level	0 to 2%	0 to 3%	A
Gently sloping	>2 to 5%	>3 to 8%	B
Strongly sloping	>5 to 10%	>8 to 15%	C
Moderately steep	>10 to 15%	>15 to 25%	D
Steep	>15 to 25%	>25 to 50%	E
Very steep	>25%	>50%	F

4. Surface Stoniness or Rockiness - must be able to recognize stoniness or rock outcrops and assess quantities present to determine significance.
  - **None:** less than listed below
  - **Very stony:** tillage of intertilled crops impracticable, hay or pasture possible, no better than class V, stones exposed on soil surface that are  $\geq 10$  inches in diameter and are less than 30 feet apart, not gravel or cobble
  - **Rock outcrop:** bedrock exposures, intertilled crops impracticable, hay or pasture possible, no better than class V, two or more bedrock exposures less than 100 feet apart within designated area to be judged, commonly found in limestone valleys

Part B. Soil Profile Features - based on exposed soil profile in the pit

1. Major soil horizons (page 71) - requires knowledge of characteristics of major soil horizon and ability to differentiate in field. Will be asked to circle soil horizons visible in the profile (wall of the pit). Possible horizons are O, A, E, B, C, R.
2. Topsoil layer thickness - requires measurement to nearest inch of the A horizon(s) in cropland or of any O horizons plus A horizon(s) in forested areas.
3. Soil Color (page 76) - influenced by organic matter content, drainage condition, or eroded condition. Requires assessment of color of both the A horizon and subsoil and substratum horizons. Munsell color books may be used in some contests.

**Topsoil (A-horizon)**--dominant moisten color of horizon

- **Brown or dark brown:** normal
- **Reddish brown:** eroded soil surface, subsoil closer to surface, inherited from parent material
- **Gray or grayish brown:** usually poor drainage condition and usually gray below
- **Black:** high organic matter content could be very poorly drained

**Subsoil and Substratum (B and/or C horizons)**-- from bottom of surface layer to bottom of pit (look at as a whole), mainly iron compound coatings responsible for color, generally these colors reflect the drainage class of the soil. The more gray colors and the higher in the soil profile, the wetter the condition of the soil (saturation), which is indicating the seasonal high water table in the soil profile.

- **Yellowish brown or red, no gray mottling due to wetness:** usually well drained condition, oxygen readily available, some grays may be due to parent material
- **Yellowish brown or red, some gray mottling due to wetness**
- **Light brown with gray mottling:** these colors indicate a wet condition, more than with "some gray mottling" but less than all gray.
- **Gray, some brown mottling:** these colors indicate a wet condition, more than the above color; only for poorly drained or very poorly drained soils and should be directly under surface layer.

4. Soil Drainage (page 91) - soil color is a good indicator; based on entire profile. Requires ability to recognize gray soil colors attributable to wetness, measure the depth these colors first appear below the surface, place in appropriate depth class and place the profile into its appropriate natural drainage class. **Caution** – on the scorecard "natural soil drainage classes" are listed in a different order than the "depth to gray due to wetness" classes.

- **Excessively drained:** all coarse textures or shallow porous profiles on steep slopes; no redoximorphic features (mottles due to wetness)
- **Well drained:** no redoximorphic features (mottles due to wetness) above 40"

- **Moderately well drained:** redoximorphic features (mottles due to wetness) between 20-40", may need drainage
- **Somewhat poorly drained:** redoximorphic features (mottles due to wetness) between 10-20", needs drainage
- **Poorly drained:** redoximorphic features (mottles due to wetness) are dominantly directly below the surface layer, needs drainage
- **Very poorly drained:** low-lying and concave or depressions, very dark or black, thick surface layer (high organic matter), gray subsoil, usually ponded

5. Soil Depth (page 89) - root restricting or affecting basements or septic systems. Both effective rooting depth and depth to bedrock is required. Criteria for both depth classes are given on exam. Effective rooting depth is the same as depth to bedrock unless a fragipan, sustained (permanent) high water table, or significant layer of coarse gravel and sand (greater than 60% gravel) occurs above bedrock. Information sign and/or proctor will provide guidance as to depth to these restrictions.

- **Very deep:** >60"
- **Deep:** 40-60"
- **Moderately deep:** 20-40"
- **Shallow:** 10-20"
- **Very shallow:** <10"

6. Soil Texture (page 81) - requires the ability to determine texture by feel on both topsoil and subsoil horizons and place in one of the 5 broad textural groups. Basic textural classes are provided on exam for further guidance. Texture samples may be provided or a depth increment may be designated for extraction of texture samples from the profile.

**Topsoil (A-horizon)**--organic matter may increase feeling of smoothness

- **Coarse:** sand, loamy sand, very gritty, no ribbon, poorly formed stable ball (if at all)
- **Moderately coarse:** sandy loam, fine sandy loam, gritty, some ribboning, stable ball
- **Medium:** loam, silt loam, sandy clay loam, maybe gritty or smooth, good ribbon (>2"), (if real gritty then must be sticky also)
- **Moderately fine:** clay loam, silty clay loam, smooth, excellent ribbon, sticky
- **Fine:** clay, sandy clay, silty clay, hard to work up, very sticky, long ribbon (>4")

**Subsoil (B horizon)**—see individual textural group information above

- **Coarse**
- **Moderately coarse**
- **Medium**
- **Moderately fine**
- **Fine**

7. Soil Permeability (page 88) - is required on both the topsoil and subsoil layers and is primarily dependent upon textural group of each of these layers. Textural groups are given on exam and correlated to respective permeability rates. **Caution** - textural group defines permeability unless the soil contains a fragipan or it is formed in a limestone or similar parent material where structure is strongly expressed. Soils with fragipans have slow permeability in the subsoil regardless of texture and soils developed from limestone have moderate permeability although subsoil texture may be in the "fine" textural group.

- **Rapid:** >6.0 in./hr., coarse textures
- **Moderately rapid:** 2.0-6.0 in./hr., moderately coarse textures

- **Moderate:** 0.6-2.0 in./hr., medium textures
  - **Moderately slow:** 0.2-0.6 in./hr., moderately fine textures
  - **Slow:** <0.2 in./hr., fine textures or fragipan present
8. Soil Reaction (page 91) - requires the ability to properly use Hellige-Truog or other test kits as demonstrated in training session to determine pH on both topsoil and subsoil layers. More precise information may or may not be provided by proctor for sampling locations. pH should be estimated to the nearest tenth, i.e. 5.7. In most cases, a 1 to 1 1/2 pH range, bracketing the measured pH, is allowed for full credit.
9. Past Soil Erosion (page 99) - The appropriate class is determined by measuring the thickness of existing topsoil layer, A horizon(s) in cropland or O horizon plus A horizon(s) in forested areas, and comparing this measured thickness to the original topsoil thickness given on the information sign. Class criteria are included on the exam.
- **None to slight:** <3" original soil lost (no mixing of subsoil)
  - **Moderate:** 3-8" original soil lost (some subsoil layer mixed with surface, but still darker than subsoil)
  - **Severe:** >8" original soil lost (surface layer and subsoil layer similar in color)

Part C. Soil and Site Interpretations - these responses are based on landscape features and soil property decisions made in the preceding Parts A and B.

1. Agriculture Suitability

- a. Major limiting factors - can check more than one; limiting to crop growth. Check all that apply, based on previous determinations and information provided on the information sign. Limiting criteria for each factor are given on the exam.
- **None:** Land Capability Class I
  - **Flooding or ponding:** check if occasional or frequent; will be noted on pit information sign
  - **Slope:** check for any >2%
  - **Past Erosion:** check only if severe
  - **Effective rooting depth:** check for any <40" deep
  - **Drainage:** check for all but well and excessively drained
  - **Permeability:** check if rapid or slow
  - **Available water capacity:** check if all coarse textures
  - **Stoniness or rock outcrop:** check if checked before
- b. Land Capability Class (page 101) - while technical criteria for Land Capability Class and subclass, as provided in soil survey reports, can be quite complex only the major Land Capability Class is requested based upon criteria listed on the exam. **Caution** - carefully heed the meaning of the words, "and" and "or" in these criteria.
- c. Prime Farmland (page 107) - based on land capability classification; check if Land Cap. Class is I or II from answer above.
- d. Hydric Soil (page 106) - is included to illustrate relationship to poorly drained and very poorly drained soils, as identified in question Part B #4, and possible wetland implications.
- e. Potential Future Erosion (page 107) - is included to emphasize the significance of future erosion potential on the site if cultivated for agricultural purposes, or otherwise disturbed in timber harvest operations, or in other urban related uses. For this exam it is based strictly on slope class determined in question Part A. #3.
- **Slight--** nearly level slopes (0 to 2% or 0 to 3%)
  - **Moderate--** gently slopes (2 to 5% or 3 to 8%)
  - **Severe--** strongly sloping to very steep (>5% or >8%)

f. Best Management Practices (page 18) - while there are numerous BMP's available for erosion control and water quality improvement, this question uses drainage class, slope, and Land Cap. Class to identify needed BMP's for the soil and site. Criteria are given on the exam.

- **Drainage:** would be needed for moderately well drained, or somewhat poorly drained, or poorly drained, or very poorly drained soils, and Land Cap. Class  $\leq$  IV.
- **Irrigation:** would be needed for excessively well drained soils and Land Cap. Class  $\leq$  IV.
- **Contour farming:** gently sloping soils and Land Cap. Class II
- **Contour stripcropping:** strongly sloping or moderately steep soils and Land Cap. Class  $\leq$  IV.
- **Grassed waterways:** site is located in a drainageway or swale which conveys concentrated runoff and Land Cap. Class  $\leq$  IV
- **No-till Farming:** Land Cap. Class  $\leq$  IV
- **Permanent vegetation:** Land Cap. class V, VI, VII, or VIII
- **Cover crops:** Land Cap. Class  $\leq$  IV

g. Nutrient Management (page 30) - requires basic knowledge of types of crops (legumes vs. non legumes), soil test results, and when nutrients as well as lime should be applied. Legume crops such as soybeans, alfalfa, and clovers do not require nitrogen. All other crops such as corn, small grains, and grasses for hay or pasture require supplemental nitrogen for optimum productivity. Recommendations are given for the crop indicated on information sign irrespective of what might actually be growing on the site. Soil tests for magnesium, phosphorus, and potassium will be given on information sign as VL = Very low, L = Low, M = Medium, H = High or VH = Very high. These nutrients are needed or recommended if the soil test is VL, L or M. The need for lime is dictated by soil reaction or pH of the topsoil layer as determined by the participant in question Part B. #8. Lime is recommended if the pH of the topsoil layer is less than 6.5.

- **Lime:** check if pH  $<$ 6.5
- **Nitrogen:** check if anything other than legumes
- **Phosphorus (Phosphate):** check if not high or very high
- **Potassium (Potash):** check if not high or very high
- **Magnesium:** check if not high or very high

2. Suitability for Septic Tank Absorption Fields - requires the ability to apply soil features determined from exposed soil profile and site in previous parts of the exam, to arrive at a suitability rating for this use. Soil features include slope, depth to bedrock, depth to gray (wetness), and subsoil permeability. The most limiting level of any of the four soil properties dictates the overall degree of suitability. Example, if the site were nearly level with bedrock  $>$  72 inches, depth to gray due to wetness in the 40 - 72 inch range and slow permeability, the suitability would be SEVERE. **Caution** - since many soil pits, for safety purposes are seldom excavated to a depth of 72 inches or more, it is presumed that conditions evident at the bottom of the exposed profile, i.e. at 60 inches for example, also represent conditions at  $>$  72 inches unless specific guidance to the contrary is provided on the information sign or by the proctor.
3. Suitability for Lawns and Golf Fairways - is similar in format to suitability for septic tank absorption fields except that key soil features are different as are some criteria depth ranges, i.e. depth to gray (wetness). This suitability rating also requires the estimation of % rock fragment (gravel) by volume in the surface layer. Representative samples of varying gravel contents should be carefully evaluated during training sessions for

reference. Soil features include soil surface texture, slope, past erosion, rock fragments in or on surface, depth to gray (wetness).

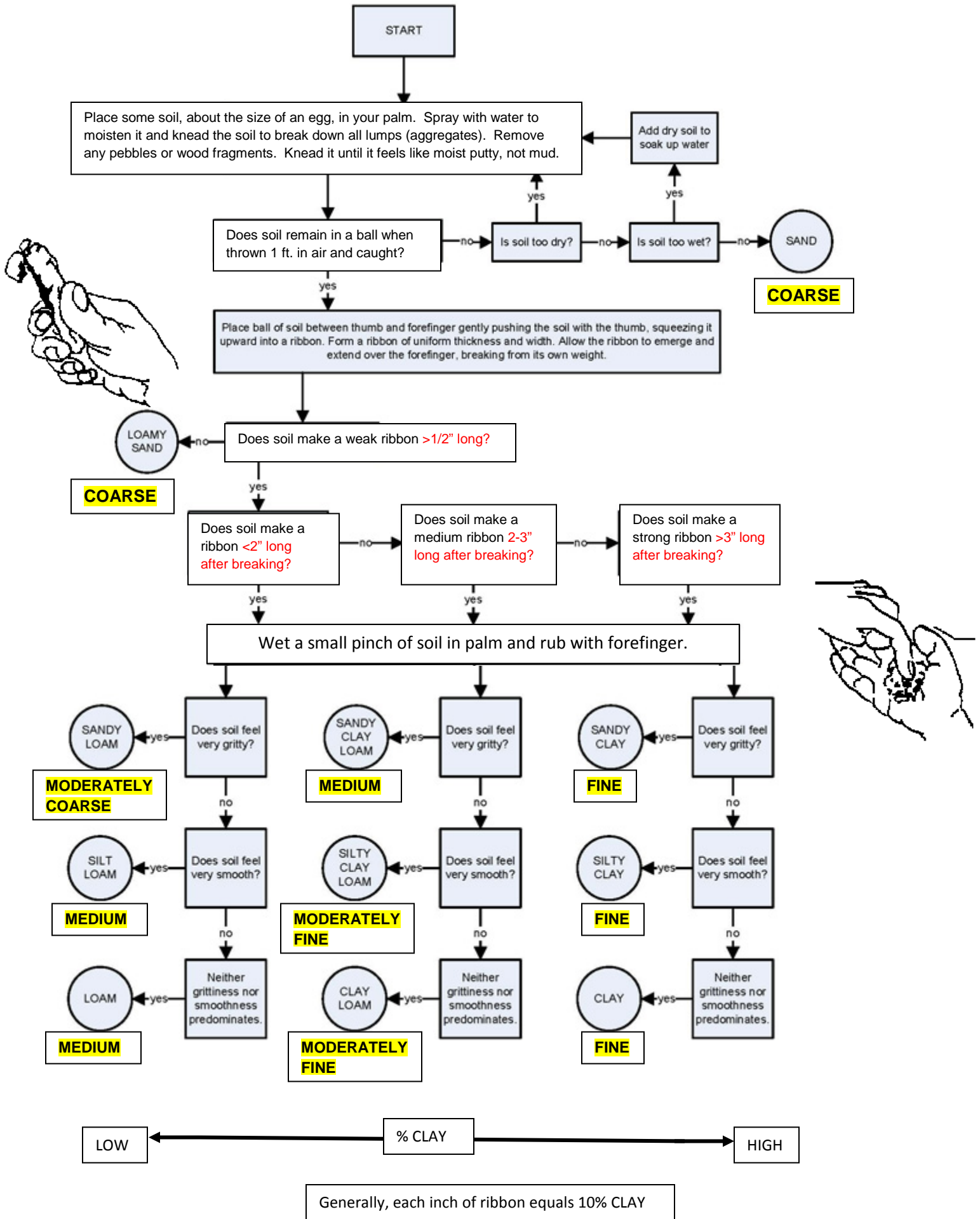
4. Suitability for Playgrounds - is similar in format to other suitability questions except soil features and criteria change. Again, soil features determined in earlier portion of exam along with rock fragment content are used to arrive at an overall suitability. Soil features include slope, soil surface texture, rock fragments in or on surface, depth to gray (wetness) and depth to bedrock.

Section II. Soil Survey Use (page 107) - this portion of exam is intended to expose the participant to the soil survey report and how to find soils information contained in it. The participant will be given a real-life scenario and a soils map with a legend of the mapping units. They will be required to use the report to find the answers to questions related to the soil map. Some questions may be related to soil interpretations others to specific soil properties. In most cases the questions will be the same across the county or state but responses will change depending upon the soil survey area. An example of a scenario is: *“You have just purchased a piece of property in ??????? County. The following is the soils map and soil legend for the property you just purchased. You’re unsure of what you want to do. You may want to develop it, do some farming, or change some areas to attract wildlife. Using the soil survey, answer the following questions to help you decide where the most appropriate places are to do these things on your property.”*

NOTE: Although the “official” soil surveys for Maryland are all on the NRCS Web Soil Survey internet site (<http://websoilsurvey.nrcs.usda.gov/app/>), for the contest, soil survey information reports will be provided to the students for answering questions.

Section III. Fifth Issue as Related to Soils - this portion of the exam consists of general knowledge questions of the current Fifth Issue subject as it is related to soils. The questions are usually taken from reference materials posted on the State Envirothon web page or from handouts provided by the soil instructors.

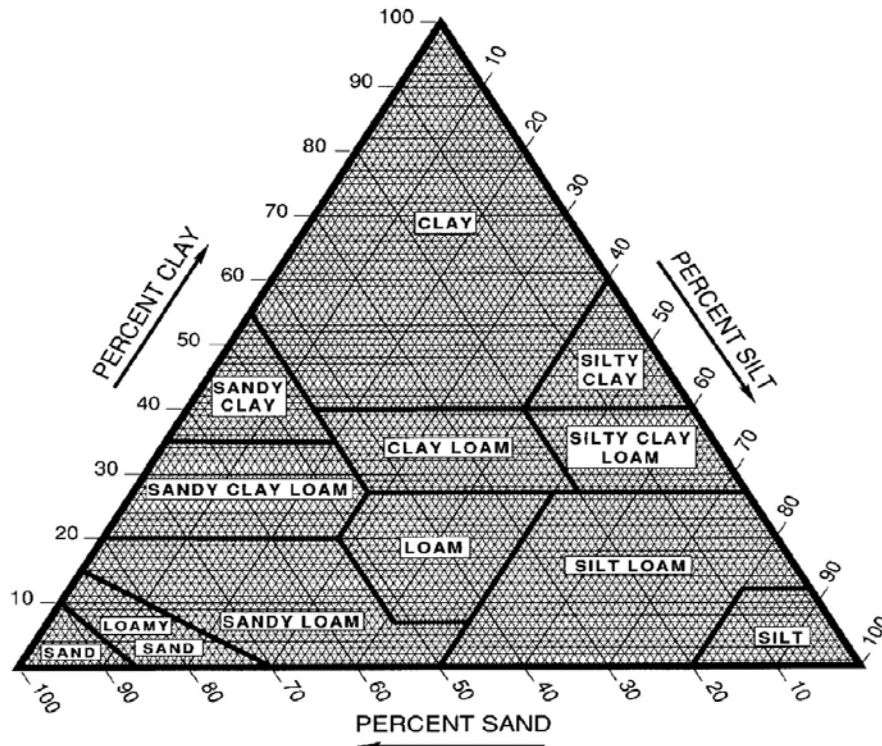
# GUIDE FOR ESTIMATING SOIL TEXTURE BY FEEL





**FIELD CRITERIA USED IN DETERMINING MAJOR TEXTURAL CLASSES**

TEXTURE CLASS MAJOR (USDA)	FEEL MOIST	ABILITY TO		SOIL HANDS	STICKY	CONSISTENCY	
		FORM STABLE BALL	RIBBON OUT			MOIST	DRY
COARSE (sand)	very gritty	no	no	no	no	loose	loose
COARSE (loamy sand)	very gritty	yes	yes, very weak <1/2" long	yes slight	no	loose	loose
MOD. COARSE (sandy loam)	gritty	yes, easily deformed	yes, dull surface poorly formed	yes	no	very friable	soft
MEDIUM (loam)	slightly gritty	yes	yes, dull surface poorly formed	yes	yes, slight to moderate	friable	soft
MEDIUM (silt loam)	velvety	yes	yes, dull surface poor to well formed	yes	yes, slight to moderate	friable	soft
MOD. FINE (silty clay loam)	velvety & sticky	yes very stable	yes, shiny surface well formed	yes	yes	friable to firm	slightly hard
MOD. FINE (clay loam)	slightly gritty & sticky	yes very stable	yes, shiny surface well formed	yes	yes	firm	slightly hard to hard
MEDIUM (sandy clay loam)	very gritty & sticky	yes very stable	yes, shiny surface well formed	yes	yes	friable to firm	slightly hard to hard
FINE (sandy clay)	very gritty ext. sticky	yes very stable	yes, shiny surface well formed	yes	yes very	firm	hard to very hard
FINE (silty clay)	ext. sticky & very smooth	yes, very resistant to molding	yes, shiny surface well formed	yes	yes very	firm to ext. firm	hard to very hard
FINE (clay)	ext. sticky & very smooth	yes, very resistant to molding	yes, shiny surface well formed	yes	yes very	firm to ext. firm	hard to very hard

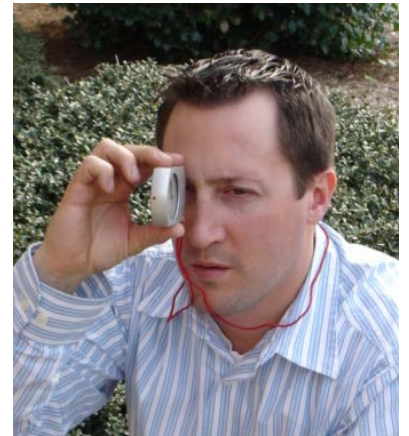




## How to Use a Clinometer

### Determining the Percentage of a Slope

1. You'll need a partner. Make sure you and your partner are standing at the same elevation, a few feet apart, facing each other.
2. Keep both eyes open.
3. Hold the clinometer up to your right eye making sure that the side window faces to your left. Be sure that the hand holding the clinometer is not obstructing the vision of your other eye.
4. While holding the clinometer to your eye, line up the crosshair and "0" (zero) reading in the clinometer. With these aligned, use your left eye to note what part of your partner's body the crosshair intersects (i.e., chin, nose, etc.).
5. Now, have your partner walk down slope to the designated spot for the slope reading. Make sure to send the taller partner down slope.



NOTE: Stay in your position! You should NOT move from the place where you are standing.

6. With your partner in their place down the slope, look through the clinometer at him/her and locate the same reference point (i.e., chin, nose, etc.) that you designated in step 4.
7. Line up that reference point with the crosshair visible in the clinometer and read the right hand scale. This will tell you the percent of the slope.

NOTE: If you rotate the scale upward you should see the % sign visible through the window. The scale is on the same side (right) as the % sign. This is the side you use when determining a slope.

Team Name: \_\_\_\_\_

Team Number: \_\_\_\_\_

## Section I: Soil and Surrounding Features (69 points total)

### Part A: Landscape Features (8 points total)

Utilizing the soils station site, answer the following questions. Place a "Check Mark" or an "X" on the blank line next to the response(s) that best answers the questions.

#### 1. Position (2 points)

- Upland
- Upland depression or drainageway
- Terrace
- Floodplain

#### 2. Parent Material (2 points)

- Residual
- Colluvium
- Recent alluvium
- Old alluvium
- Coastal plain sediments

#### 3. Slope Characteristics

(2 points)

Slope Class	Coastal Plain (Percentage)	Piedmont-Appalachian (Percentage)
<input type="checkbox"/> Nearly level	0-2	0-3
<input type="checkbox"/> Gently sloping	2-5	3-8
<input type="checkbox"/> Strongly sloping	5-10	8-15
<input type="checkbox"/> Moderately steep	10-15	15-25
<input type="checkbox"/> Steep	15-25	25-50
<input type="checkbox"/> Very steep	25+	50+

#### 4. Surface Stoniness or Rockiness

(2 points)

- None
- Very stony (less than 30 ft. apart)
- Rock outcrop (2 exposures within 100 ft.)

Team Name: \_\_\_\_\_

Team Number: \_\_\_\_\_

**Part B: Soil Profile Features in Pit (35 points total)**

From the examination of the soils profile in the pit, please answer the following questions.

1. Circle the major soil horizons visible in this profile: (4 points)

O    A    E    B    C    R

2. How thick is the topsoil layer, O and/or A horizon(s)? \_\_\_\_\_ inches  
(You will use this answer in question #9) (2 points)

3. Soil Color (2 point each column)

(a) Topsoil - A horizon

(b) Subsoil and Substratum – B and/or C horizon

\_\_\_ Brown or dark brown

\_\_\_ Yellowish brown or red,  
no redox depletions (gray  
mottling/wetness)

\_\_\_ Reddish brown

\_\_\_ Yellowish brown or red,  
some redox depletions (gray  
mottling/wetness)

\_\_\_ Gray or grayish brown

\_\_\_ Light brown with redox depletions  
(gray mottling/wetness)

\_\_\_ Black

\_\_\_ Gray, some brown redox  
concentrations (mottling/wetness)

4. Soil Drainage (3 points each column)

(a) Depth to gray due to wetness

(b) Natural soil drainage class

\_\_\_ Directly under a thick black  
colored surface

\_\_\_ Excessively well drained

\_\_\_ 0 - 10 inches

\_\_\_ Well drained

\_\_\_ 10 - 20 inches

\_\_\_ Moderately well drained

\_\_\_ 20 - 40 inches

\_\_\_ Somewhat poorly drained

\_\_\_ 40 - 72 inches

\_\_\_ Poorly drained

\_\_\_ More than 72 inches

\_\_\_ Very poorly drained

Team Name: \_\_\_\_\_

Team Number: \_\_\_\_\_

**5. Soil Depth**

*(2 points each column)*

(a) Effective Rooting Depth

(b) Depth to Bedrock

_____	Very shallow (less than 10 inches)	_____
_____	Shallow (10 to 20 inches)	_____
_____	Moderately deep (20 to 40 inches)	_____
_____	Deep (40 to 60 inches)	_____
_____	Very deep (greater than 60 inches)	_____

**6. Soil Texture from box samples**

*(3 points each column)*

(a) Topsoil - A horizon

(b) Subsoil - B horizon

_____	Coarse - sand, loamy sand	_____
_____	Moderately coarse - sandy loam	_____
_____	Medium - loam, silt loam, sandy clay loam	_____
_____	Moderately fine - silty clay loam, clay loam	_____
_____	Fine - clay, silty clay, sandy clay	_____

Tie breaker: % Clay in subsoil \_\_\_\_\_

**Bonus Question: What is the Munsell Soil Chart Notation for the Subsoil layer? (2 points)**  
From bag sample.

\_\_\_\_\_ Hue value/chroma

Team Name: \_\_\_\_\_

Team Number: \_\_\_\_\_

**7. Soil Permeability**

**(2 points each column)**

(a) Topsoil - A horizon

(b) Subsoil - B horizon

- |       |   |       |
|-------|---|-------|
| _____ | Rapid (>6.0 in./hr.)<br>(Coarse texture)                          | _____ |
| _____ | Moderately rapid (2.0-6.0 in./hr.)<br>(Moderately coarse texture) | _____ |
| _____ | Moderate (0.6-2.0 in./hr.)<br>(Medium texture)                    | _____ |
| _____ | Moderately slow (0.2-0.6 in./hr.)<br>(Moderately fine texture)    | _____ |
| _____ | Slow (<0.2 in./hr.)<br>(Fine texture or fragipan present)         | _____ |

**8. Soil Reaction**

**(2 points)**

Using the pH test kit, what is the pH of:

Subsoil - B horizon \_\_\_\_\_

**9. Past Soil Erosion = Original topsoil thickness (from information sign) minus current topsoil thickness (from question #2)**

**(3 points)**

- \_\_\_\_\_ Slight (less than 3" of original soil lost)
- \_\_\_\_\_ Moderate (3-8" of original soil lost)
- \_\_\_\_\_ Severe (greater than 8" of original soil lost)

Team Name: \_\_\_\_\_

Team Number: \_\_\_\_\_

**Part C: Soil and Site Interpretations (26 points total)**

Using the determinations from Landscape and Soil Profile Features (Parts A & B) answer the following questions.

**1. Agricultural Suitability**

(a) Major limiting factors (Check all that apply) (2 points)

- \_\_\_\_\_ None
- \_\_\_\_\_ Flooding or ponding (Occasional or Frequent)
- \_\_\_\_\_ Slope (Gently sloping or greater)
- \_\_\_\_\_ Past erosion (Severe)
- \_\_\_\_\_ Effective rooting depth (<40" deep)
- \_\_\_\_\_ Drainage (<40" to gray mottles/wetness, redox depletions)
- \_\_\_\_\_ Coarse textures (Topsoil and subsoil)
- \_\_\_\_\_ Very stony or rock outcrop

(b) Land Capability Class (Check one) (3 points)

- \_\_\_\_\_ I No limiting factors, nearly level
- \_\_\_\_\_ II Gently sloping, or moderately well drained, or moderately deep
- \_\_\_\_\_ III Strongly sloping, or somewhat poorly drained, or poorly drained, or shallow, or coarse textures
- \_\_\_\_\_ IV Moderately steep, or very poorly drained, or occasionally flooded
- \_\_\_\_\_ V Nearly level and very stony, rock outcrop, or frequently flooded
- \_\_\_\_\_ VI Steep, or gently sloping through steep with a very stony surface or rock outcrop
- \_\_\_\_\_ VII Very steep with or without a very stony surface or rock outcrop, or very shallow soils
- \_\_\_\_\_ VIII Swamp, tidal marsh, coastal beach, rock outcrop or urban land

(c) Is this Prime Farmland, i.e. Land Capability Class I or II? (2 points)

\_\_\_\_\_ Yes \_\_\_\_\_ No

(d) Is this a Hydric Soil, i.e. poorly drained or very poorly drained? (2 points)

\_\_\_\_\_ Yes \_\_\_\_\_ No

Team Name: \_\_\_\_\_

Team Number: \_\_\_\_\_

(e) Potential future erosion if cultivated or disturbed.

(2 points)

- \_\_\_\_\_ Slight (nearly level)
- \_\_\_\_\_ Moderate (gently sloping)
- \_\_\_\_\_ Severe (strongly sloping - very steep)

(f) Best management practice(s) needed at this site. (Check all that apply and use drainage class, slope and Land Cap. Class as criteria)

(4 points)

- \_\_\_\_\_ Drainage (moderately well, somewhat poor, poorly drained, or very poorly drained and Land Cap. Class  $\leq$  IV)
- \_\_\_\_\_ Irrigation (excessively well drained and Land Cap. Class  $\leq$  IV)
- \_\_\_\_\_ Contour farming (gently sloping and Land Cap. Class = II)
- \_\_\_\_\_ Contour strip-cropping (strongly sloping or moderately steep and Land Cap. Class  $\leq$  IV)
- \_\_\_\_\_ Grassed waterway (drainageway or swale which conveys concentrated runoff and Land Cap. Class  $\leq$  IV)
- \_\_\_\_\_ No-till farming (Land Cap. Class  $\leq$  IV)
- \_\_\_\_\_ Permanent vegetation (Land Capability Class V, VI, VII or VIII)
- \_\_\_\_\_ Cover crops (Land Cap. Class  $\leq$  IV)

(g) Nutrient Management

Crop to be grown (from information on sign): \_\_\_\_\_

Soil test results from information on sign (no points):

pH of surface \_\_\_\_\_  
Magnesium \_\_\_\_\_  
Phosphorus \_\_\_\_\_  
Potassium \_\_\_\_\_

Check the following if needed:

(1 point each = 5 points)


- \_\_\_\_\_ Lime (based on topsoil pH from information on sign)
- \_\_\_\_\_ Nitrogen
- \_\_\_\_\_ Magnesium
- \_\_\_\_\_ Phosphorus (Phosphate)
- \_\_\_\_\_ Potassium (Potash)




Team Name: \_\_\_\_\_

Team Number: \_\_\_\_\_

**2. Suitability for Septic Tank Absorption Fields (Check the appropriate suitability with the most limiting soil property) (2 points)**

<b>MORE LIMITING</b>  	<b>SOIL PROPERTIES</b>					<b>SUITABILITY</b>
	Slope	Flooding	Depth to Bedrock	Depth to Gray (wetness)	Subsoil Permeability	<u>CHECK ONE BELOW</u>
	Nearly level, gently sloping	None	> 72"	> 72"	Moderately rapid or moderate	___ <b>SLIGHT</b>
	Strongly sloping	Rare	40-72"	40-72"	Moderately slow	___ <b>MODERATE</b>
	Moderately steep to very steep	Frequent, Occasional	<40"	<40"	Slow or rapid	___ <b>SEVERE</b>


**3. Suitability for Lawns and Golf Fairways (Check the appropriate suitability with the most limiting soil property) (2 points)**

<b>MORE LIMITING</b>  	<b>SOIL PROPERTIES</b>					<b>SUITABILITY</b>
	Slope	Soil Surface Texture	Rock Fragments in/on Surface	Past Erosion	Depth to Gray (wetness)	<u>CHECK ONE BELOW</u>
	Nearly level, gently sloping	Mod. coarse, medium	< 15% gravel	Slight	>24"	___ <b>SLIGHT</b>
	Strongly sloping	Mod. fine, coarse	15-35% gravel	Moderate	12-24"	___ <b>MODERATE</b>
	Moderately steep to very steep	Fine	> 35% gravel or very stony, rock outcrops	Severe	<12"	___ <b>SEVERE</b>

Team Name: \_\_\_\_\_

Team Number: \_\_\_\_\_

**4. Suitability for Playgrounds (Check the appropriate suitability with the most limiting soil property) (2 points)**

<b>MORE LIMITING</b>  	<b>SOIL PROPERTIES</b>					<b>SUITABILITY</b>
	Slope	Soil Surface Texture	Rock Fragments in/on Surface	Depth to Gray (wetness)	Depth to Bedrock	<u>CHECK ONE BELOW</u>
Nearly level	Mod. coarse, medium, mod. fine	< 15% gravel	> 30"	>40"	___	<b>SLIGHT</b>
Gently sloping	----- -	15-35% gravel	18-30"	20-40"	___	<b>MODERATE</b>
Strongly sloping to very steep	Fine, coarse	> 35% gravel or very stony, rock outcrops	< 18"	<20"	___	<b>SEVERE</b>

Team Name: \_\_\_\_\_

Team Number: \_\_\_\_\_

**Section II: Soil Survey Use** *how to use soil survey, what and where information is, interpretation tables (what kind of uses covered), use of field sheets (maps), inherit soil variability.* (22 points total)

Circle the correct answer(s) or write the appropriate response in the space provided.

You have just purchased a piece of property in a County. The following is the soils map for the property you just purchased. You would like to build a house on the property as well as do some farming and develop some areas to attract wildlife. Answer questions, using the soil survey report, to help you decide where the most appropriate places are to do these things on your property.



**Section III: Fifth Issue – “Different every year”** is an important topic in today’s world. As a conservation planner working for the Natural Resources Conservation Service, you are to answer the following questions pertaining to soil resource concerns.

Will be common sense questions.

Just think of the soil properties that you’ve learned, how they would affect the fifth issue.

Team Name: \_\_\_\_\_

Team Number: \_\_\_\_\_