Midterm Procedure Log

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Problem Statement: As an archaeologist, I must find possible locations of civil war mobile army surgical units during the Battle of Gettysburg and suggest archaeological dig sites as well as a new museum location based on this. The museum location will also be based on ALL of the following criteria:

1. Within 200 ft. of a stream (Criteria 1)
2. Within 300 ft. of a road (Criteria 2)
3. Within 2,000 feet of or inside a battle zone (Criteria 3)
4. Within 200 ft. of a location where artifacts have already been discovered (Criteria 4)
5. Within 2,000 ft. of but not inside of a historic residential area (Criteria 5)
6. Within areas that have a relatively flat slope (Criteria 6)

Important Considerations:

- Most surgical units were stationed close to the fighting
- Surgical units were usually located along an existing road
- Surgical units would have been near a stream
- The tents would have needed to be placed on flat ground
- Encampments would've been near an area that was residential during the time period

Coordinate System: NAD 1983 UTM Zone 18N meters

Provided Data:

- streams.shp - Streams in and around Gettysburg National Military Park
- soilspol.shp - Soils in and around Gettysburg National Military Park with slope class attributes of each polygon. Soil type A has the least steep slope
- roadsarc.shp – Current roads in and around Gettysburg National Military Park
- histland.shp - Historic land use in and around Gettysburg National Military Park (Do not use road data from this file)
- battles2.shp - Some of the Civil War battle zones within Gettysburg National Military Park
- battles1.shp - Some of the Civil War battle zones within Gettysburg National Military Park
- artifacts.shp - Locations where Civil War artifacts have previously been found

About the Model:

- Model Name: cagause_midterm_model
- Model Location: cagause_midterm_toolbox
- Toolbox name: cagause_midterm_toolbox.tbx
- Model Purpose: To show the process of finding areas that meet the criteria listed above, in ArcMap, in order to recommend the best archaeological dig sites and the possible locations for a new museum. Additionally, to show the appropriate tools and shape files to use in order to achieve desired results.
- Input Layers: streams, soilspol, roadsarc, histland, battles2, battles1, artifacts
- Output layer upon completion: Final_Solution.shp (output layer will be added to display)

Procedure:

1. Define the projection for every layer
    a. Tool: Define Projection
    b. Input: each provided shapefile
    c. Coordinate system: NAD 1983 UTM Zone 18N meters

Model Builder Procedure:

1. Find areas within 300 ft. of a road:
    a. Tool: Buffer
    b. Input: roadsarc.shp
    c. Output: Criteria_1.shp
    d. Distance 300 ft
    e. End Type: Round
    f. Dissolve type: ALL
2. Find all areas within 200 feet of a stream:
    a. Tool: Buffer
    b. Input: streams.shp
    c. Output: Criteria_2.shp
    d. Distance: 200 ft
    e. End Type: Round
    f. Dissolve type: ALL
3. Find areas within 200 ft. of locations where artifacts have already been discovered:
    a. Tool: Buffer
    b. Input: artifacts.shp
    c. Output: Criteria_3.shp
    d. Distance: 200 feet
    e. End Type: Round
    f. Dissolve type: ALL
4. Find areas to those within 2,000 feet of or inside a battle zone:
    a. Merge both battle zones
        i. Tool: Merge
        ii. Input: battles1
        iii. Input: battles2
        iv. Output: Battle_zones.shp
    b. Find areas that meet the criteria
        i. Tool: Buffer
        ii. Input: Battle_zones.shp
        iii. Output: Criteria_4.shp
        iv. Distance 2000 ft
        v. End Type: Round
        vi. Dissolve type: ALL
5. Find areas within 2,000 ft. of (but not inside of) a historic residential area
    a. Find areas that were historically residential
        i. Tool: select by attribute

        ii. Input: histland.shp
        iii. Output: Residential_areas.shp
        iv. Expression: “LAND_USE”= ‘residnt’
    b. Find all areas within 2000 feet of these residential areas
        i. Tool: Buffer
        ii. Input: Residential_areas.shp
        iii. Output: Criteria_5.shp
        iv. Distance: 2000 feet
        v. Side Type: OUTSIDE_ONLY
        vi. End Type: Round
        vii. Dissolve type: ALL
6. Find areas that have a relatively flat slope
    a. Tool: Select by Attribute
    b. Input: soilspol.shp
    c. Output: Criteria_6.shp
    d. Expression: “SLOPE”=’A’
7. Find areas that meet all six criterion:
    a. Tool: Intersect
    b. Inputs: Criteria_1, Criteria_2, Criteria_3, Criteria_4, Criteria_5, Criteria_6
    c. Output: Criteria_Intersect.shp
8. Turn any single area into one polygon
    a. Tool: Dissolve
    b. Input: Criteria_Intersect.shp
    c. Output: Criteria_dissolved.shp
9. Change any multipart polygons to single part polygons
    a. Tool: Multipart to Singlepart
    b. Input: Criteria_dissolved.shp
    c. Output: Final_Solution.shp

Quiz Question 1: What is the area, in square meters, of the largest (single- not multipart or common area) polygon that meets all of the search criteria? (make sure to dissolve all polygons and use the Multipart to Single Part tool to turn your dissolved multipart feature into a single part feature) – 9373.05 square meters