Use 18N for dataframe

1. Added elevation tiles in arcmap.
2. Merge into single raster dataset.
3. Use Mosaic to ‘New Raster’ TOOL.
4. Use Spacial Analyst ‘Fill’ TOOL.
5. Use ‘Flow Direction’ TOOL with the filled dem as input.
6. Flow accumulation raster: For each point on the grid, how many cells drain to that point?
7. New shapefile -> outlet
8. Use ‘Watershed’ tool. Input FDir and outlet.
9. Convert watershed raster to polygon.
10. Use raster calculator to create a new layer which identifies points with flow accumulation > 1000.
11. Use ‘Stream Link’ TOOL. FDir and Greater1000 are the inputs.
12. *From this we can derive catchments/small watersheds of the different streams.*
13. Each stream has its own catchment.
14. Stream order: 1st-4th order streams.
15. Use ‘Stream Order’ TOOL. Inputs: stream link, flow direction.
16. Use ‘Raster to Polyline’ TOOL with strlink as input.
17. Use ‘Raster to Polyline’ TOOL with stream order as input.
18. Layer: strOrder. Gridcode = stream order
19. Use ‘Spatial Join’ TOOL. Inputs: catchments, streams.
20. Catchments\_streams\_SJoin. Grid\_code: Streams, Gridcode: Catchments
21. Use catchments\_streams\_sjoin instead of streams.
22. Add ‘name’ field to ‘stream\_lines’ layer.

Spatial Analyst: ‘Flow Direction’ tool

Look in S:classes lab 10: open mxd, and look for soil, soil groups, precipitation, and land cover data. Download data from the gateway for Howard county.

Parcels? Yes. Research the plan for elicott city, and identify those locations. Get whatever data that will help identify/locate.

Land cover and soil data obtained from various sources will be transformed into a spatial model of overland flow in the watershed.

Make sure you have all the flow layers.

Clip soils to watershed boundary, then raster to polygon.

Clip landcover, then union soils and landcover layers.

Add CN field to the union layer.

Add acres, percent area, and CN fields.

What is:

CN, Potential Maximum Retention, and depth of direct runoff.

Use CN as replacement for land use? Get land use data anyway and see if there’s a difference

The slope layer was derived from the DEM, with a resolution of 5 m × 5 m, using the Slope tool in ArcMap. It was reclassified in a scale from 1 to 5, where a value of 5 was given to lower slopes and 1 was given to higher values (details are shown in Table 2).

Look at table 2.

***Distance to Streams:***

The measure of distance to streams plays an important role in defining areas susceptible to flooding. The zones closest to rivers are the most affected by floods. To obtain these distances, the Euclidean Distance tool was used in the Spatial Analyst Tools in ArcGIS. The reclassification was based on assigning a value of 5 to areas farthest from streams, and a value of 1 to areas near streams

***Curve Number:***

The CN is an empirical parameter by the Soil Conservation Service (SCS) used in hydrology for predicting direct runoff or infiltration from rainfall excess. It considers the characteristics of land use and soil type. The values of CN ranged from 100 for impermeable surfaces to 30 for very permeable soils with low runoff potential. The CN map was obtained using both the land-use type data and the soil type. CN values are published by the SCS for different land uses and soil types [23]. As a high CN means high runoff and low infiltration and a low CN means low runoff and high infiltration, high values of CN where assigned to a scale of 5, and low values were assigned a CN value of 1

***Total Precipitation:***

Daily precipitation data from four rain gauge stations in the Don River watershed, from 2009 to 2016, were used to create the precipitation-isohyet map generated by interpolating the monthly average precipitation data, for the wet season (May to October), using the inverse distance weighted (IDW) interpolation method. The TP map was reclassified on a scale from 1 (for low values of TP) to 5 (for high values of TP)

***Effective Precipitation:***

Effective precipitation represents the precipitation after losses (such as infiltration and evapotranspiration). It is calculated using the total precipitation and the CN at a given point using Equation (1) [34]: EP = TP − 5080 CN + 50.82 TP + 20,320 CN − 203.2 (1) where EP is the effective precipitation in mm, TP is the precipitation of the storm in mm, and CN is the Curve Number. Table 2 shows that high values of EP were assigned to a scale of 5, and low values were assigned to a scale of 1.

Create an ERD, and store attribute table info on mysql.

Analyze, then try to bring it back to arcmap after.

Collapse Summary by Map Unit — Howard County, Maryland (MD027)

Summary by Map Unit — Howard County, Maryland (MD027)

Map unit symbol Map unit name Rating Acres in AOI Percent of AOI

BaA Baile silt loam, 0 to 3 percent slopes C/D 202.1 1.5%

CeB Chillum loam, 2 to 5 percent slopes C 19.4 0.1%

CeC Chillum loam, 5 to 10 percent slopes C 11.3 0.1%

ChB Chillum-Russett loams, 2 to 5 percent slopes C 114.9 0.8%

ChC Chillum-Russett loams, 5 to 10 percent slopes C 156.3 1.1%

Co Codorus and Hatboro silt loams, 0 to 3 percent slopes C 220.5 1.6%

CrD Croom and Evesboro soils, 10 to 15 percent slopes C 58.8 0.4%

FaaA Fallsington sandy loams, 0 to 2 percent slopes, northern coastal plain C/D 75.2 0.5%

GbB Gladstone loam, 3 to 8 percent slopes A 96.8 0.7%

GbC Gladstone loam, 8 to 15 percent slopes A 38.9 0.3%

GcB Gladstone-Legore complex, 3 to 8 percent slopes A 60.4 0.4%

GcC Gladstone-Legore complex, 8 to 15 percent slopes A 70.8 0.5%

GdC Gladstone-Legore complex, 8 to 15 percent slopes, stony A 54.9 0.4%

GdD Gladstone-Legore complex, 15 to 25 percent slopes, stony A 132.5 1.0%

GfB Gladstone-Urban land complex, 0 to 8 percent slopes A 252.3 1.8%

GfC Gladstone-Urban land complex, 8 to 15 percent slopes A 197.5 1.4%

GgB Glenelg loam, 3 to 8 percent slopes B 295.0 2.2%

GgC Glenelg loam, 8 to 15 percent slopes B 38.1 0.3%

GhB Glenelg-Urban land complex, 0 to 8 percent slopes B 1,281.6 9.3%

GhC Glenelg-Urban land complex, 8 to 15 percent slopes B 70.9 0.5%

GmA Glenville silt loam, 0 to 3 percent slopes C 7.9 0.1%

GmB Glenville silt loam, 3 to 8 percent slopes C/D 111.6 0.8%

GmC Glenville silt loam, 8 to 15 percent slopes C 58.7 0.4%

GnB Glenville-Baile silt loams, 0 to 8 percent slopes C 217.0 1.6%

GoB Glenville-Codorus silt loams, 0 to 8 percent slopes C 89.1 0.6%

GuB Glenville-Urban land-Udorthents complex, 0 to 8 percent slopes C 168.0 1.2%

Ha Hatboro-Codorus silt loams, 0 to 3 percent slopes B/D 188.8 1.4%

JaB Jackland silt loam, 3 to 8 percent slopes D 46.2 0.3%

LaB Legore silt loam, 3 to 8 percent slopes C 39.5 0.3%

LaC Legore silt loam, 8 to 15 percent slopes C 142.6 1.0%

LeB Legore silt loam, 3 to 8 percent slopes, stony C 16.4 0.1%

LeC Legore silt loam, 8 to 15 percent slopes, stony C 295.3 2.2%

LmB Legore-Montalto silt loams, 3 to 8 percent slopes C 328.5 2.4%

LoB Legore-Montalto-Urban land complex, 0 to 8 percent slopes C 1,000.0 7.3%

LoC Legore-Montalto-Urban land complex, 8 to 15 percent slopes C 346.2 2.5%

LrD Legore-Relay gravelly loams, 15 to 25 percent slopes, very stony C 336.4 2.5%

LrF Legore-Relay gravelly loams, 25 to 65 percent slopes, very stony C 407.7 3.0%

MaB Manor loam, 3 to 8 percent slopes B 49.8 0.4%

MaC Manor loam, 8 to 15 percent slopes B 374.8 2.7%

MaD Manor loam, 15 to 25 percent slopes B 230.2 1.7%

McD Manor loam, 15 to 25 percent slopes, very rocky B 50.6 0.4%

MgD Manor-Bannertown sandy loams, 15 to 25 percent slopes, rocky B 180.1 1.3%

MgF Manor-Bannertown sandy loams, 25 to 65 percent slopes, rocky B 365.2 2.7%

MkF Manor-Brinklow complex, 25 to 65 percent slopes, very rocky B 90.5 0.7%

MoB Mount Lucas silt loam, 3 to 8 percent slopes, stony C/D 89.1 0.6%

MoC Mount Lucas silt loam, 8 to 15 percent slopes, stony C/D 55.5 0.4%

RsC Russett fine sandy loam, 5 to 10 percent slopes C 23.1 0.2%

RsD Russett fine sandy loam, 10 to 15 percent slopes C 7.1 0.1%

RuB Russett and Beltsville soils, 2 to 5 percent slopes C 9.3 0.1%

RuC Russett and Beltsville soils, 5 to 10 percent slopes C 11.4 0.1%

SaB Sassafras loam, 2 to 5 percent slopes B 29.8 0.2%

SaC Sassafras loam, 5 to 10 percent slopes B 19.7 0.1%

SfB Sassafras gravelly sandy loam, 2 to 5 percent slopes B 2.2 0.0%

SrC Sassafras and Croom soils, 5 to 10 percent slopes B 73.9 0.5%

SrD Sassafras and Croom soils, 10 to 15 percent slopes B 62.0 0.5%

SrE Sassafras and Croom soils, 15 to 25 percent slopes B 11.1 0.1%

UaF Udorthents, Highway, 0 to 65 percent slopes 470.8 3.4%

UbF Udorthents, Refuse, 0 to 65 percent slopes 36.6 0.3%

UcB Urban land-Chillum-Beltsville complex, 0 to 5 percent slopes C 247.9 1.8%

UcD Urban land-Chillum-Beltsville complex, 5 to 15 percent slopes C 111.7 0.8%

UfA Urban land-Fallsington complex, 0 to 2 percent slopes D 32.1 0.2%

UsB Urban land-Sassafras-Beltsville complex, 0 to 5 percent slopes D 26.6 0.2%

UsD Urban land-Sassafras-Beltsville complex, 5 to 15 percent slopes D 25.6 0.2%

UtD Urban land-Udorthents complex, 0 to 15 percent slopes D 248.9 1.8%

UuB Urban land-Udorthents complex, 0 to 8 percent slopes D 410.5 3.0%

UuD Urban land-Udorthents complex, 8 to 25 percent slopes D 13.0 0.1%

W Water 49.7 0.4%

WaA Watchung silt loam, 0 to 3 percent slopes C/D 18.8 0.1%

WcB Watchung silt loam, 3 to 8 percent slopes, stony C/D 330.0 2.4%

WdaB Woodstown sandy loam, 2 to 5 percent slopes, Northern Coastal Plain C 5.6 0.0%

Subtotals for Soil Survey Area 11,011.3 80.3%

Totals for Area of Interest 13,713.7 100.0%

SG D: (Select by attributes)

"MUSYM" IN ( 'BaA' , 'FaaA' , 'GmB' , 'Ha' , 'MoB' , 'MoC' , 'UfA' , 'UsB' , 'UsD' , 'UtD' , 'UuB' , 'UuD' , 'WaA' , 'WcB' )

SG C:

"MUSYM" IN( 'CeB' , 'CeC' , 'ChB' , 'ChC' , 'Co' , 'CrD' , 'GmA' , 'GmC' , 'GnB' , 'GoB' , 'GuB' , 'LaB' , 'LaC' , 'LeB' , 'LeC' , 'LmB' , 'LoB' , 'LoC' , 'LrD' , 'LrF' , 'RsC' , 'RsD' , 'RuB' , 'RuC' , 'UcB' , 'UcD' , 'WdaB' )

SG B:

"MUSYM" IN( 'GgB' , 'GgC' , 'GhB' , 'GhC' , 'MaB' , 'MaC' , 'MaD' , 'McD' , 'MgD' , 'MgF' , 'MkF' , 'SaB' , 'SaC' , 'SfB' , 'SrC' , 'SrD' , 'SrE' )

SG A:

"MUSYM" IN( 'GbB' , 'GbC' , 'GcB' , 'GcC' , 'GdC' , 'GdD' , 'GfB' , 'GfC' )

Use a new geodatabase in E: for everything.

Save consistently

Map high flood risk areas and see if they match up with what they are planning.

Group D: Clay

21 – Developed Open Space

**Add CN values to landcover\_soils\_union**

composite curve # for the watershed or CN: 65.607225

Depth of Direct Runoff (Pe) for a 100-year, 24-hour storm event

Given a precipitation of: P = 7.5 inches

Potential Maximum Retention:

**S = 5.24**

 Initial Abstractions = 1.05

Depth of Direct Runoff = 41.6/11.69 = 3.56

Contours: <https://data.howardcountymd.gov/>

1. Merge contour tiles into one, and clip to watershed boundary.
2. Create TIN using contour lines
3. RAS geometry -> stream centreline, to create river layer