Soil Data Assignment

Purpose: To add soil data to the St Paul Campus GIS

Result: Soil data that includes information on relative water holding capacity, which we'll use to scale runoff generation

The Natural Resources Conservation Service (NRCS) is responsible for national soil data development. They've conducted a series of soil inventories that have mapped soil patches to series and slope/terrain condition, and call these a "map unit." It is the name they give to areas with a more or less consistent set of measured properties. They refer to a standard "map unit symbol" and other variables to specify the set of properties that a particular patch of soil exhibits, and they've organized a set of tables for the scads of variables they've measured for each type of map unit.

They have created a web application which allows you to download the polygon boundaries of each mapped unit, and to select the tables or table attributes you want to download. We won't get too fancy, and because the database is a bit complex for newcomers, we'll give you instructions on how to download a set of properties we'll use to help us map the relative ability of soils to store runoff. We admit that this is a very crude, and probably quantitatively incorrect measure of infiltration, but it is a reasonable approximation, given the time constraints and our teaching goals.

We've used the NRCS tool to download soils data for the campus area. There is a soils directory on the shared class drive, with spatial and tabular subdirectories.

Find the ***soilmu_a_aoi*** in the spatial subdirectory, and display it in ArcMap. This should be a set of polygons depicting soil mapping units for the St. Paul Campus.

Load the \Soil\SoilData***muaggatt*** tables from the \tabular subdirectory into ArcMap. This is a text file, and looks something like the figure at right when you view it in a text editor like notebook on a PC or textedit on a Mac.

ArcMap allows you to load a text file as a table, but in this case it often doesn't interpret the columns correctly, and you are left with missing columns and without labels.

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"155D"|"Chetek sandy loam, 12 to 25 percent slopes"||16|16||||"None"|"None"|"0"|3.3|6.22|
7.72|9.22|"Somewhat excessively drained"|"Somewhat excessively drained"|"A"||100|"6"|
90|"Very limited"|"Very limited"|"Not rated"|"Very limited"|"Very limited"|"Not
rated"|"Very limited"|"Very limited"|"Very limited"|"Very limited"|"Fair"|"Not
rated"|"Somewhat limited"|0.02|"Severe"|"0"|1|"1677202"
"411"|"Waukegan silt loam, 0 to 2 percent slopes"||1|1||||"None"|"None"|"0"|5.75|11|14.48|
15.98|"Well drained"|"Well drained"|"B"||100|"2"|90|"Not limited"|"Not limited"|"Not
limited"|"Not rated"|"Very limited"|"Not rated"|"Very limited"|"Very limited"|"Very
limited"|"Not limited"|"Fair"|"Not rated"|"Somewhat limited"|0.013|"Slight"|"0"|
1|"1677243"
"411B"|"Waukegan silt loam, 2 to 6 percent slopes"||3|3||||"None"|"None"|"0"|5.75|11|
14.48|15.98|"Well drained"|"Well drained"|"B"||100|"2"|90|"Not limited"|"Not limited"|"Not
limited"|"Not rated"|"Very limited"|"Not rated"|"Very limited"|"Very limited"|"Very
limited"|"Not limited"|"Fair"|"Not rated"|"Somewhat limited"|0.013|"Moderate"|"0"|
1|"1677244"
"857"|"Urban land-Waukegan complex, 0 to 3 percent slopes"||1|1||||"None"|"None"|"0"|5.75|
11|14.48|15.98||"Well drained"|||100||65|"Not rated"|"Not rated"|"Not limited"|"Not
rated"|"Not rated"|"Not rated"|"Very limited"|"Not rated"|"Not rated"|"Not rated"|"Not
rated"|"Not rated"|"Not rated"|0.013|"Not rated"|"0"|1|"1677277"
"857C"|"Urban land-Waukegan complex, 3 to 15 percent slopes"||6|6||||"None"|"None"|"0"|
5.75|11|14.48|15.98||"Well drained"|||100||65|"Not rated"|"Not rated"|"Not limited"|"Not
rated"|"Not rated"|"Not rated"|"Very limited"|"Not rated"|"Not rated"|"Not rated"|"Not
rated"|"Not rated"|"Not rated"|0.013|"Not rated"|"0"|1|"1677278"
"858"|"Urban land-Chetek complex, 0 to 3 percent slopes"||2|2||||"None"|"None"|"0"|3.05|
5.8|7.38|8.88||"Somewhat excessively drained"|||100||65|"Not rated"|"Not rated"|"Not
limited"|"Not rated"|"Not rated"|"Not rated"|"Very limited"|"Not rated"|"Not rated"|"Not
rated"|"Not rated"|"Not rated"|"Not rated"|0.001|"Not rated"|"0"|1|"1677279"
"858C"|"Urban land-Chetek complex, 3 to 15 percent slopes"||6|6|||"None"|"None"|"0"|3.05|
5.48|6.98|8.48||"Somewhat excessively drained"|||100||65|"Not rated"|"Not rated"|"Not
limited"|"Not rated"|"Not rated"|"Not rated"|"Very limited"|"Not rated"|"Not rated"|"Not
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It is generally better to open the table in Excel and change the column separators from | to commas.

You should keep the last column, it contains musym numbers on the order of 1677202, as you will use this column as a key later when you join tables. Also save the first two columns, and the two columns that contain text like "Somewhat excessively drained."

The column sequence corresponds to the order of description in the muaggatt_table_description.pdf found in the CLD:\ESPMX295\Soils directory. This describes each column, and contents.

Add column names, and save this table to an Excel file.

Use the ArcMap tool "Table to Excel" to convert this to a table in your geodatabase, name it something like muaggatt.

Join the ***soilmu_a_aoi*** table with the ***muaggatt*** table via the *musym* attribute. The attribute is labeled in the polygon shapefile, and you can match it to the last column (the 16xxxxxx number) in the muaggatt table by the values.

For our purposes, we'll make the gross generalization that descriptions like "somewhat excessively drained" values give us an index of absorption capacity. Note that one of the two columns is more complete (has fewer blank rows), but still has blank rows. Also note that the blank rows are all designated urban, so add the value "urban" to the descriptive column.

Excessively or somewhat well drained can absorb 75% of the first 3" of rain reaching the ground, all after that is runoff

Well drained can absorb 75% the first 1" of rainfall, all after that is runoff and

Urban lands can absorb 75% of the first ½" of rainfall, all after that is runoff

Export the joined file to create a new layer, with the soil properties integrated.

Name the new soil Feature Data Class **soils_*with_detail*** *in* the geodatabase.