Semester Project

Much of the semester will focus on data collection and analysis needed to manage rainfall and runoff on your project area. A surprising amount of money and effort is spent by municipalities to manage water from storms. Flooding is among the top one or two causes of property damage nationwide in most years, and therefor is the subject of much spatial analysis. It is also a good vehicle to apply the skills you've learned so far in this class, and to pick up new ones.

Our primary goals are to estimate the amount of rainwater leaving each of your study areas via the rainwater sewer system overland flow, and to estimate how much additional canopy will reduce storm water exports. To do this you need to estimate the amount of water delivered to each stormwater grate in your study area from a 1", a 2", and a 4" storm. This will involve a very simplified set of analyses. Note that you do not need to worry what "runs on" to your project area from adjacent areas – you can consider your study area as a hydrologic "island." I know, this isn't very realistic, but you'll have to do all the analysis steps that you'd do in a larger study area, without having to wait for folks upstream to finish their work, and without getting bogged down in a huge data collection exercise.

Basically, you will assume that the forest canopy and vegetation intercepts the first ¼ inch of rainfall, that grass and flowerbeds absorb a percentage of the rainfall based on their soil type, and that impervious surfaces (buildings, streets, sidewalks, etc.) absorb none of the rainfall that falls on them – it all is runoff.

We will assume the two absorption effects are additive, that is, trees over asphalt will absorb the first ¼ inch of rain, and trees over grass will absorb the ¼ inch for the canopy, and then as much as the limits set by the soil type.

You will calculate the amount of runoff with the landscape "as is," and also add storage to the extent needed to reduce stormsewer exports from i) a ¼" storm, and ii) a 1" storm to zero. This recommendation will take the form of a map of additional areas to provide forest canopy, and of areas to build additional infiltration – rain gardens or underground infiltration tanks.

You need to do several things, among them:

- Collect ground surface cover, tree/large shrub canopy extent, sewer grate locations, and other data for your project area.
- To do the step above, you'll need to combined aerial photographs from past and present, and collect data from both.
- You'll need to organize the soils data, and come up with estimates of absorption percentage.
- You'll need to create flow-direction and flow accumulation rasters from available DEMs, modify them so that the stormwater grates effectively capture the water

flowing to them, identify the “watersheds” for each grate, and calculate the amount of water that enters each grate.
- You’ll be provided the network of subsurface pipes on campus, and you’ll use these to accumulate the flow input from each grate along the storm sewer paths, so that you can estimate the amount exiting your study area from each “tree” of connected stormwater drains. You can do this step manually, in that you can summarize flow to each drain, and then add together the flow from each “trunk” line that leaves your project area.
- You’ll need to identify areas that aren’t captured by sewer grates and drain outward from your project area, and calculate the total that flows off your project area from these.

The above is not a complete list of all your tasks, it is rather to give you a rough road map and better idea to help you plan.

There is one, large, final constraint. You need to all build your geodatabases in a form such that the data you’ll use in your analysis can be easily and seamlessly merged into a single, campus-wide layer. This means the class needs to agree upon a standard set of layers, layer names, variable types, order, and names, raster resolutions, coordinate system, and all other characteristics required to complete the analysis.

Each person will draft a description of a geodatabase template in the first fews week, and we’ll discuss and adopt a standard early on.

Each person will also have to think through, and create, a flowchart of their analysis path, and turn it in. You’ll have to resolve the major steps, check to make sure these can be completed, and string them together in a graph.