

Rural Hydrology Example Instructions:

These text-only instructions walk you through the design steps that we've covered in the course, using ArcGIS 10.x (Advanced License), Spatial Analyst, and EFH2. If you get stuck, refer back to the relevant video lecture. The project site is located in Washington County, The Town of Argyle, approximately 1 mile North/Northeast of Summit Lake.

Coordinates:

Lat/Long: 43.221813 North, 73.457868 West

UTM: Zone 18N, 625246m E, 4786602m N

Closest Address: 452 County Route 47, Argyle, NY, 12809.

Step 1: Gather Background Data

1. Digital Elevation Models (DEMs). These can be downloaded from the NY GIS Clearinghouse through the Orthoimagery Application Web map. This area of Washington County has 2m Lidar, so get those. You will need multiple tiles because they are small.

<https://gis.ny.gov/gateway/mg/>

When working with multiple rasters in ArcGIS, it is best to combine them into a mosaic dataset. This doesn't physically combine the rasters into one, but it allows you to perform operations on a whole collection of rasters in order to produce seamless results. The instructions for creating a mosaic dataset are here:

<http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#//009t000000p4000000.htm>

2. Soils data. Download the Washington County, NY data from Web Soil Survey. Open the included template database in MS Access. Load in the tabular data using the macro that pops up.

Load the soils shapefile into ArcMap and point Soil Data Viewer to the newly configured Access database. Map the hydrologic soil groups and save the resulting layer in a file geodatabase or as a shapefile.

Step 2: Draw your watershed and land use areas

Use Spatial Analyst to display contours from the 2m DEM. You don't need to convert the DEM to English units, but you may. Create a new shapefile and add your watershed polygon to it.

In a separate shapefile, trace over the land use areas in the watershed by examining the aerial photos of it. Add a "land_use" column to the shapefile and type in the cover description you would like to use for each area.

Step 3: Do some basic processing

Use the Geoprocessing->Intersect tool to combine the land use shapefile with the hydrologic soil groups shapefile, giving you regions split by land use and soil group.

Add a new field called "Acres" to the intersected layer's data table. Right click the top and use the "calculate geometry tool" to add the area in acres to each line.

Inside the attribute table dialog box, click the main dropdown and look for the export option. Export the table as a text file rather than a file or personal geodatabase.

Open your text file in Excel and create a pivot table using the Hydrologic Soil Group, Land Use and Areas columns. This will sum the areas in each category for input into EFH2.

Step 4: Compute the Average Watershed Slope and longest flow path

Draw in the longest flow path into ArcGIS in a shapefile, or simply as graphics.

To compute the average watershed slope, first create a slope raster from the elevation raster (DEM). Use the "Slope" tool, found under Spatial Analyst Tools->Surface->Slope.

Then use the "Zonal Statistics as Table" tool, found under Spatial Analyst Tools->Zonal->Zonal Statistics as Table. Use the slope raster and watershed shapefiles as inputs to find the mean slope in the watershed.

Step 5: Input Data into EFH2

Go through EFH2 and input the data you've gathered so far. You may need to visit the NRCS NY Engineering website to determine which county rainfall amount and distribution to use.

Compute your weighted CN value and Time of Concentration. Once you've entered all data, go to the Rainfall/Discharge table to view your results.