GEOL-304 Assignment 1 January 24th, 2011

(Total marks 20)

This assignment is due by February 2nd

1) You have been asked to estimate the maximum likely discharge from a proposed residential subdivision with an area of 10 ha. Assume that 75% of the area will be "residential" (includes houses, lots and roads), 20% will be park and 5% will be an asphalt parking lot. Assume a maximum rainfall rate of 20 mm/h. Use whatever C values you feel appropriate from the chart in the notes, but indicate what values you use. (7 points)

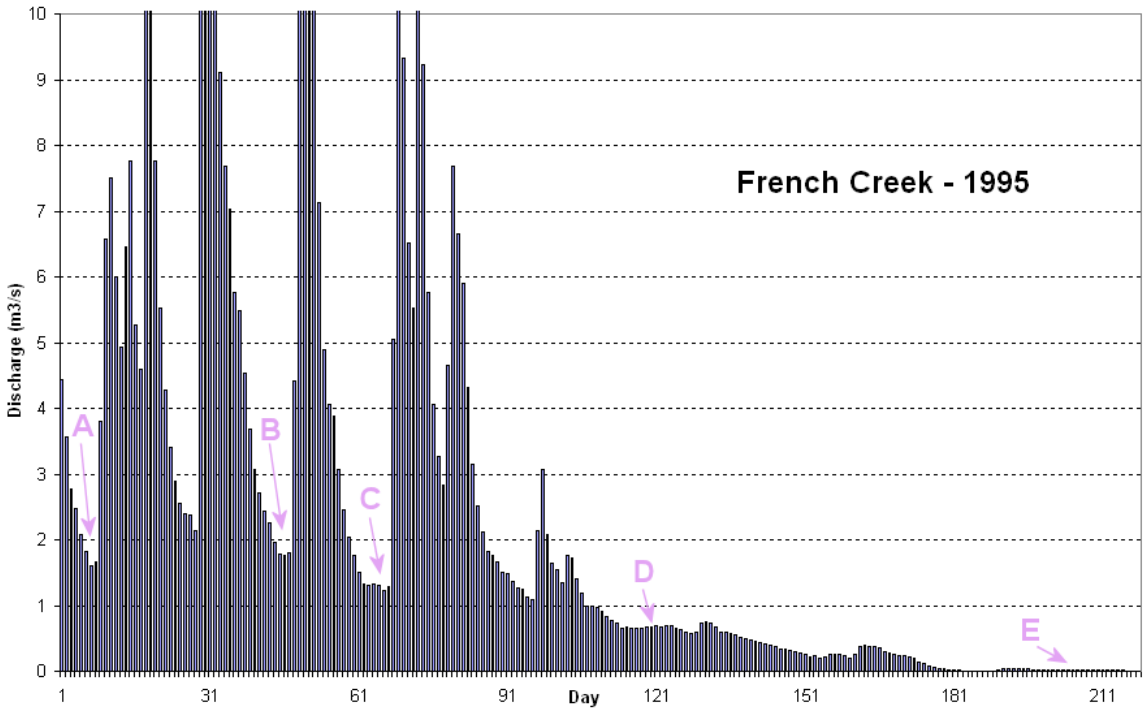
2) There is one small creek draining the entire site described in question 1 and you need to design a v-notch weir that will allow you to measure the discharge. What size of weir should you build (i.e., what value of H)? (2 points)

3) Go to the Environment Canada Water Surveys website: http://www.wsc.ec.gc.ca/applications/H2O/index-eng.cfm and search for hydrographic data for "Goldstream". You should get two results, one for "Goldstream River in Goldstream Park" (on Vancouver Island) and one for "Goldstream River below Old Camp Creek". Look at the hydrographs for both of these sites. Describe the differences and explain why they are different. Where is the "other" Goldstream River located. (8 points)

4) Estimate the duration of overland flow for French Creek using the formula given in the notes and the fact that the drainage basin has an area of 87 km^2. (1 point)

5) Explain what a stage-discharge curve is used for. (2 points)

5) The following figure shows the discharge for French Creek for the first ~7 months (275 days) of 1995. (Discharges above 10 m^3/s are not shown.) The baseflow discharges at points A to E are 1.6, 1.8, 1.2, 0.7 and 0.01 m^3/s respectively. What is baseflow? Explain why the baseflow is so different at these various times. (4 points)



6) The glacial till and the glacio-fluvial gravel that we sampled on campus had roughly similar porosities (30 to 40%) but their apparent permeabilities (based on our perc tests) differed by a factor of 20. Explain. (3 points)

7) There are several ways of estimating the permeability of a deposit of unconsolidated sediments, including (but not limited to): (a) grain-size analysis, (b) permeameter testing and (c) slug testing in an observation well. Briefly describe the theoretical basis for each of these types of tests, the situations under which they might be applicable and their advantages and disadvantages (15 points).