

GEOL-304 Assignment 2 - March 2nd, 2011

(Total marks 40)

This assignment is due by Wednesday March 2nd

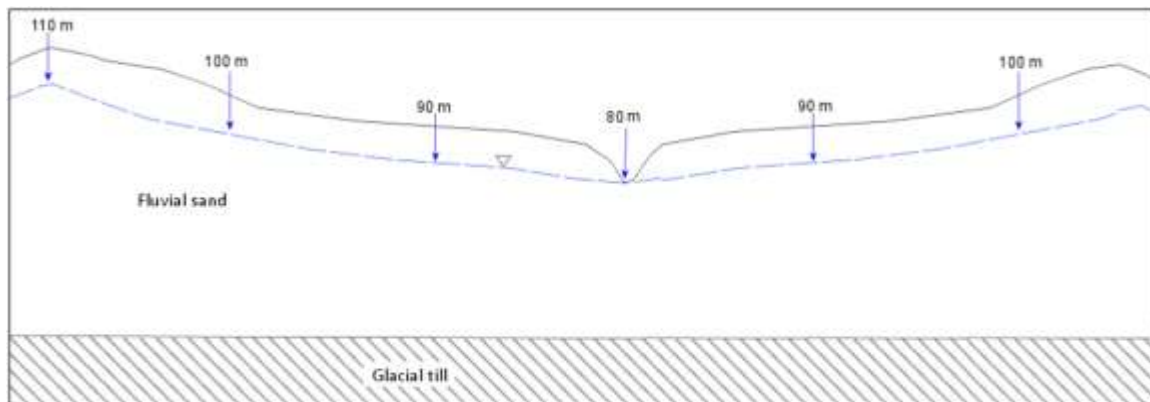
1) Three observation wells have been established in an unconfined sandy aquifer. The well parameters are summarized in the following table (all values in metres):

Hole	East	North	Collar elevation	Depth to water
OW-1	22	63	17.5	3.4
OW-2	4	12	23.1	2.8
OW-3	58	27	18.8	7.4

Draw a diagram showing the well locations, and plot a series of water-table contours at 1-metre intervals. If the conductivity of the sand is estimated to be 4.0×10^{-3} cm/s, how long would it take for groundwater to flow between holes OW-2 and OW-3? (10 points)

2) A nested piezometer has been set up in an unconfined sandstone aquifer, with well A screened at a depth of 27 m and well B screened at a depth of 15 m. The two wells are less than 1 m apart and the static water levels are 12.4 and 9.8 m respectively. Is groundwater flowing upwards or downwards at this location? Assuming a conductivity of 1.0×10^{-4} cm/s, what is the vertical component of the flow rate? (5 points)

3) The unconfined aquifer in the drawing below is comprised of a medium grained fluvial sand with $K = 2.5 \times 10^{-3}$ cm/s. For the impermeable layer $K = 1.0 \times 10^{-6}$ cm/s. Draw a flow net (with flow lines and equipotential lines) showing how you think groundwater flows in this cross-section. (10 points)



4) Using Visual MODFLOW set up the scenario that we did in class and that is described on the website (You can find it under *Study Guide and Lecture Notes*). When you have run the model, and displayed some flow-velocity arrows, take a screen shot and import it into a Word document. (To do this hit the “Print Screen” button on your keyboard and then go into a Word document and click on Paste or just hit ctrl-V.) Next, set up a pumping well at 450 m east and 800 m north and get it to pump at 10 USGPM or 54 m³/day for 500 days (make sure to use a negative number, otherwise MODFLOW will assume that you’re pumping water into the well, not out of it). Run the model again and this time display a cross section that goes through the well and import that into your document. If you don’t have a copy of the text (which has the MODFLOW disk in it) let me know and you can borrow my copy. (15 points)