Groundwater and stream stage worksheet (20 pts total)

1. Measure water levels in all three wells, and staff gauges and record the data (4 pts).

Monitoring site	Measuring point elevation (m)	Depth to water (m)	Water table elevation (m)
MW1	1644.58		
MW2	1644.24		
MW3	1643.66		
GUS	1642.68*		
GDS	1640.98*		

* elevation of staff gauge at H = 50 cm mark

2. Measure water quality in all three wells and in the river and record the data (4 pts).

Well	Temperature (°C)	Specific conductance (µS/cm)	Total dissolved solids (mg/L)	Salinity (ppt)
MW1				
MW2				
MW3				
River				

3. Using the map (or google maps) determine the distances, slopes, and hydraulic gradients between sites and record the data (4 pts).

Sites	Distance (m)	Slope (m/m)	Hydraulic gradient (I)
MW1 to MW2			
MW1 to GUS			
MW2 to MW3			
MW2 to GDS			
MW1 to MW3			

4. From the internet or a soils book provide and estimate of hydraulic conductivity (K) and porosity (n) (1 pts).

    a. K =

    b. n =

5. Darcy's Law. Recall that Darcy's Law states that Q = KIA. From this please calculate the SPECIFIC DISCHARGE (also called Darcy Flux or Darcy Velocity).

    a. Darcy velocity = v = KI (1 pts)

- What is the problem here?

We now realize that calling this a "Darcy Velocity" isn't correct, because it implies that water is moving at this velocity. It isn't!! Water moves faster than predicted by the specific discharge equation when flowing through a porous medium.

- Specific discharge would predict accurate velocity for flow through a pipe, but doesn't account for the extra travel path length that water molecules take in a porous medium
- The solution: To find the actual velocity of the moving water: we must include a porosity term

b. Now incorporate your estimate of n and calculate a new specific discharge

$$v = KI/n$$

c. Use your specific discharge (Darcy velocity) values to calculate how long it would take for water to move between the various locations indicated in the table below (5 pts)

d. Compare your GW velocities to the average stream velocity you measured. Are they of the same order of magnitude or no (1 pts)?

Flowpath	Darcy velocity	Flowpath length	Travel time	Velocity corrected for n	Flowpath length	Travel time
MW1 to MW2						
MW1 to GUS						
MW2 to MW3						
MW2 to GDS						
MW1 to MW3						

*Please indicate what units you are using by filling them in on this table.