

Name: \_\_\_\_\_

**Problem Set 1**

**Hydrogeology (ERS 580)** Complete the activities and answer the questions listed below. Show your calculations. Neatness counts.

1. Using the Farm Rd., Farm, and Stewart locations only, determine the flow directions and horizontal hydraulic gradient in the bedrock aquifer.
2. Consult a table of hydraulic conductivity in your textbook. Using an estimate for the hydraulic conductivity of metamorphic rock, estimate the specific discharge in the bedrock aquifer.
3. At the Bryand, Farm Rd., and Stewart locations, significant overburden is present. At these locations about 20 ft, of brown silty material overlies dense gray till. Construct a generalized cross section (to scale) oriented along a flow path starting near the Farm Well and ending at the Stillwater River. Draw in equipotentials and include several arrows indicating direction of flow.
4. Contour the potentiometric surface in the bedrock aquifer. Indicate the general flow pattern with flow lines.
5. Calculate the transmissivity of the glacial till near the Stewart Well based on your cross section and tabulated hydraulic conductivity values in your textbook.
6. What is the water pressure, in pounds per square inch and newtons per meter squared, at the bottom of the Bryand bedrock well?
7. Assuming that water at the top of the Bryand Well has a density of  $1.0 \text{ g} \cdot \text{cm}^3$ , what is the density of water at the bottom of this well?

ID	Well Depth below grade(ft)	Well Elevation (m)	Bedrock Depth (ft)	Water Depth (m)
Bryand	20	35.54		3.32
Bryand	250	35.80	37.8	4.23
Stewart	20	37.18		1.46
Stewart	45	37.29		1.41
Stewart	250	37.43	62.	4.55
River	0	22.23		-.28
River	250	25.48	7.	2.41
Farm Rd	15	33.74		1.41
Farm Rd	37	33.81		1.10
Farm Rd	260	33.92	37.	0.89
Farm	120	58.73	18.	12.91
Farm	250	57.97	19.	12.11

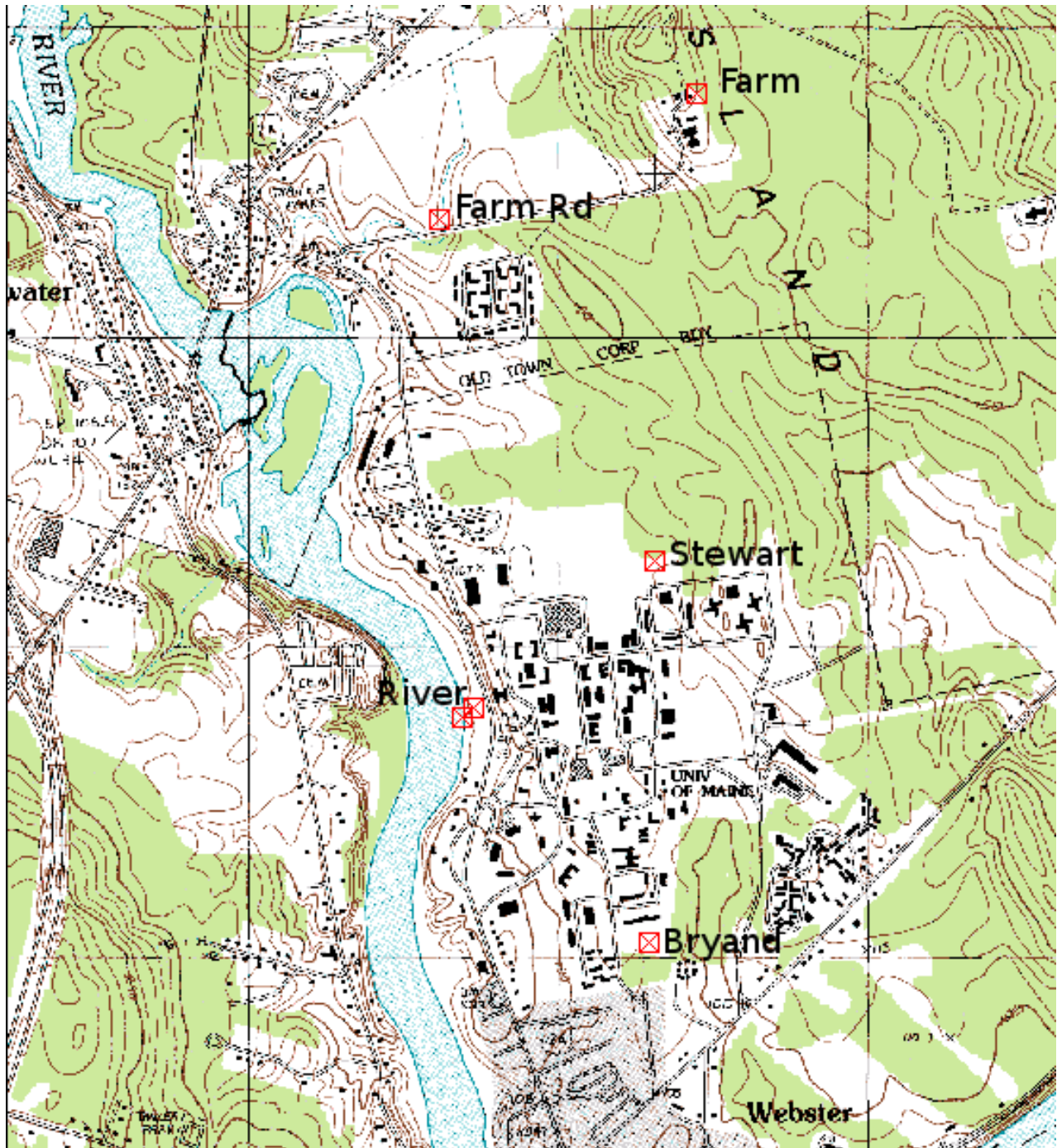


Figure 1: Map of University of Maine. Well and River stations are indicated by boxed X's. North is toward to top of the page. Topography is contoured at 10 ft. intervals. Grid shown on map is spaced at a 2000 m interval.