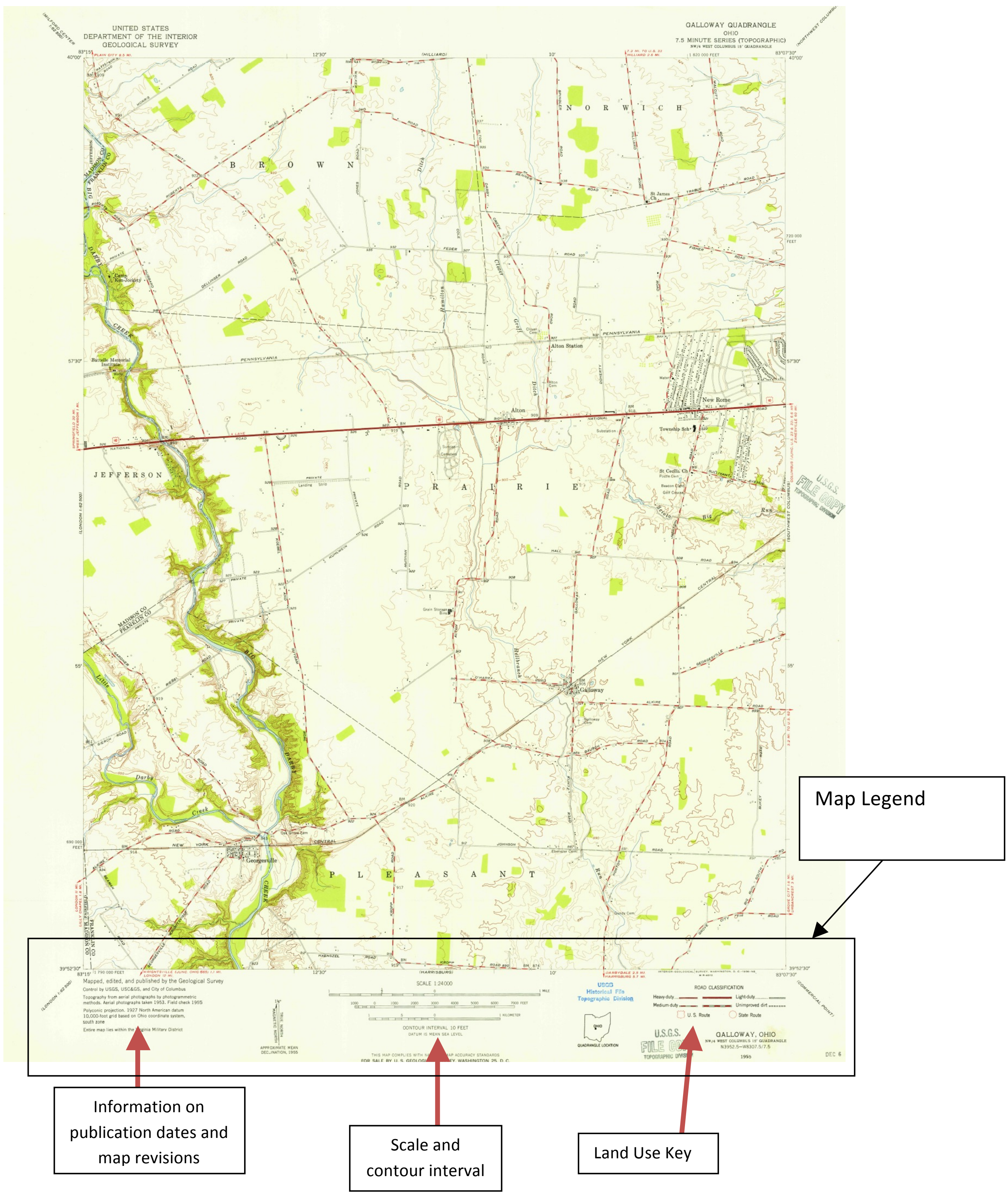
Reading and Interpreting Topographic Maps (Optional)

Topographic maps provide a wealth of information on the physical condition of land area. If the user is not experienced in reading and interpreting topographic maps, the first step to be taken is becoming acquainted with the map legend.



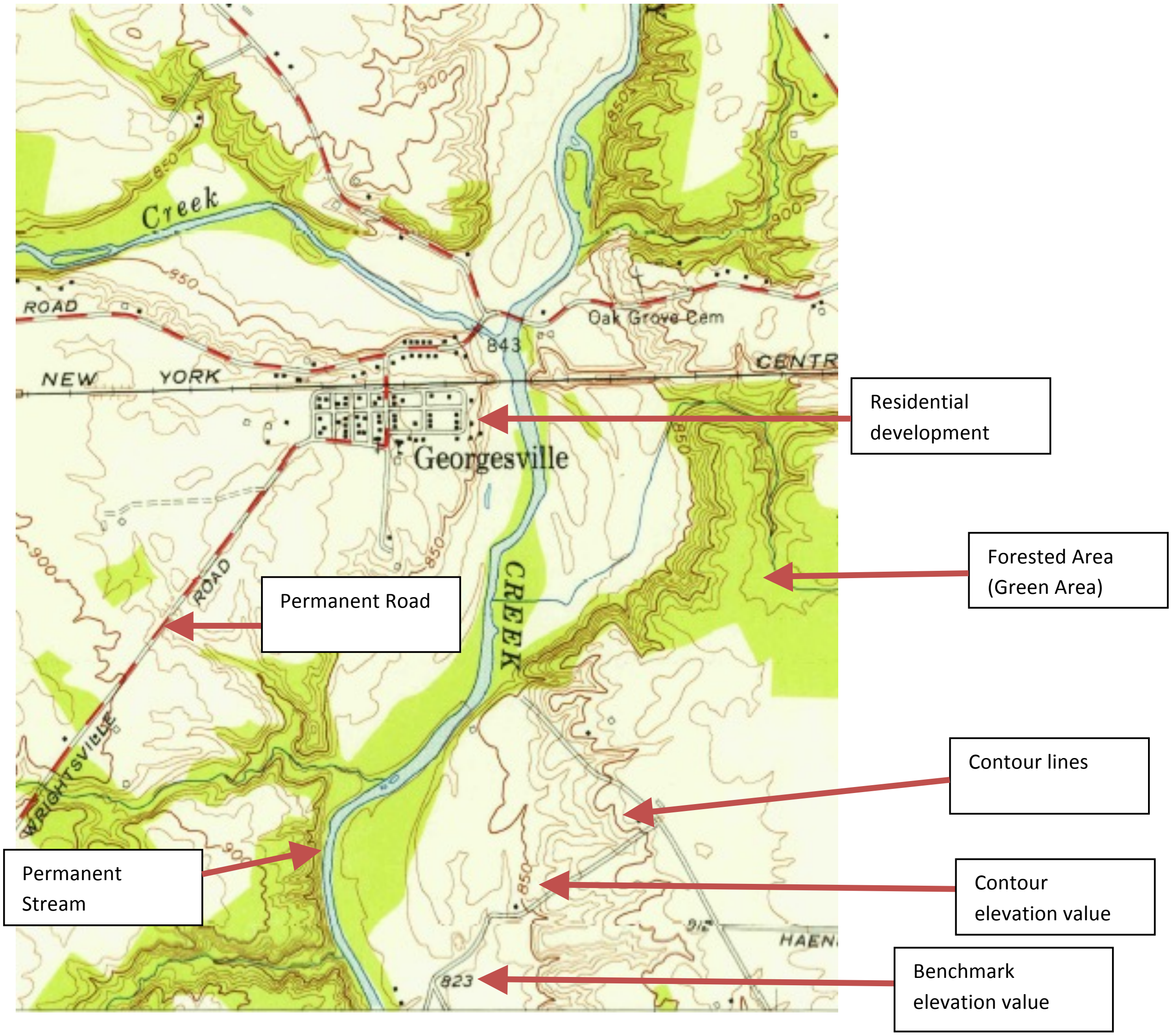
The map legend contains a significant amount of information. Among the information pertinent to watersheds is the scale, the land use (including any permanent water bodies and land development that occurred between the most recent revisions to the map), and the topography (e.g. elevation and terrain) of the area described by the topographic map.

The scale is essential for understanding the area occupied by land features as well as determining gradients, which are required for determining the path of surface water flow and estimating the path of groundwater flow.

The value of information on land use is self-evident, as this describes the features that occupy land surface. These features could be naturally-occurring, such as forested areas or water bodies. The features could also be manufactured, such as residences, buildings, or roads.

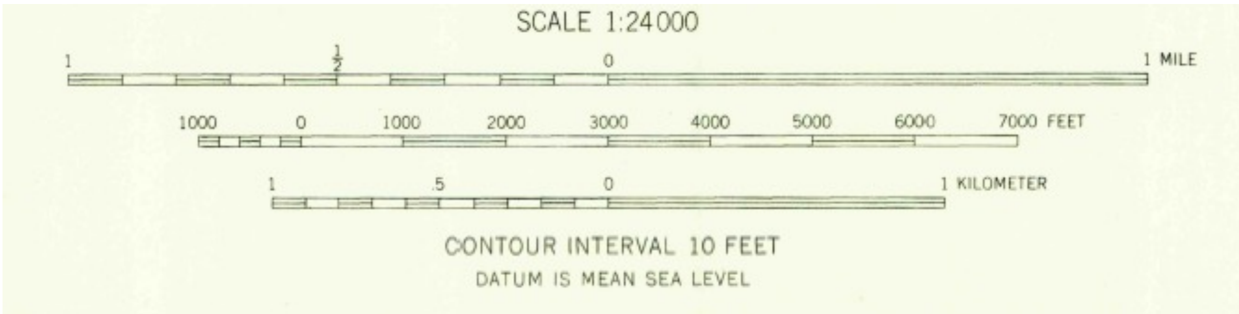
Information on topography is especially important for this exercise, as topography is essential for identifying watershed boundaries, as well as identifying the path of surface water flow.

A closer look at the topography of a sample map, with a sample of surface land features described by the map:



The brown lines on the map are known as contour lines. Contour lines describe the change in surface elevation over a linear horizontal distance. The elevation is indicated by values that are in-line with the contour lines. Elevation is also indicated from benchmarks that are indicated as independent features on the map. Thick contour lines represent significant elevation values, and are usually shown as increments of 50 feet (e.g. 850 feet and 900 feet in this example).

The contour interval is the standard change in surface elevation described by adjoining contour lines. The contour interval is provided in the map legend.



Thus, for this map, adjoining contour lines represent a change in surface elevation of 10 feet. Contour intervals may vary from map-to-map; thus, it is important to note the contour interval prior to inspection of any topographic map. The topographic slope can be determined from the contour interval and the map scale. The map scale provides information on the linear horizontal distance over which the vertical change in elevation occurs. The contour interval provides information about the absolute change in vertical distance (elevation) over the horizontal distance. Thus, the topographic slope can be determined simply by the formula for slope, which is:

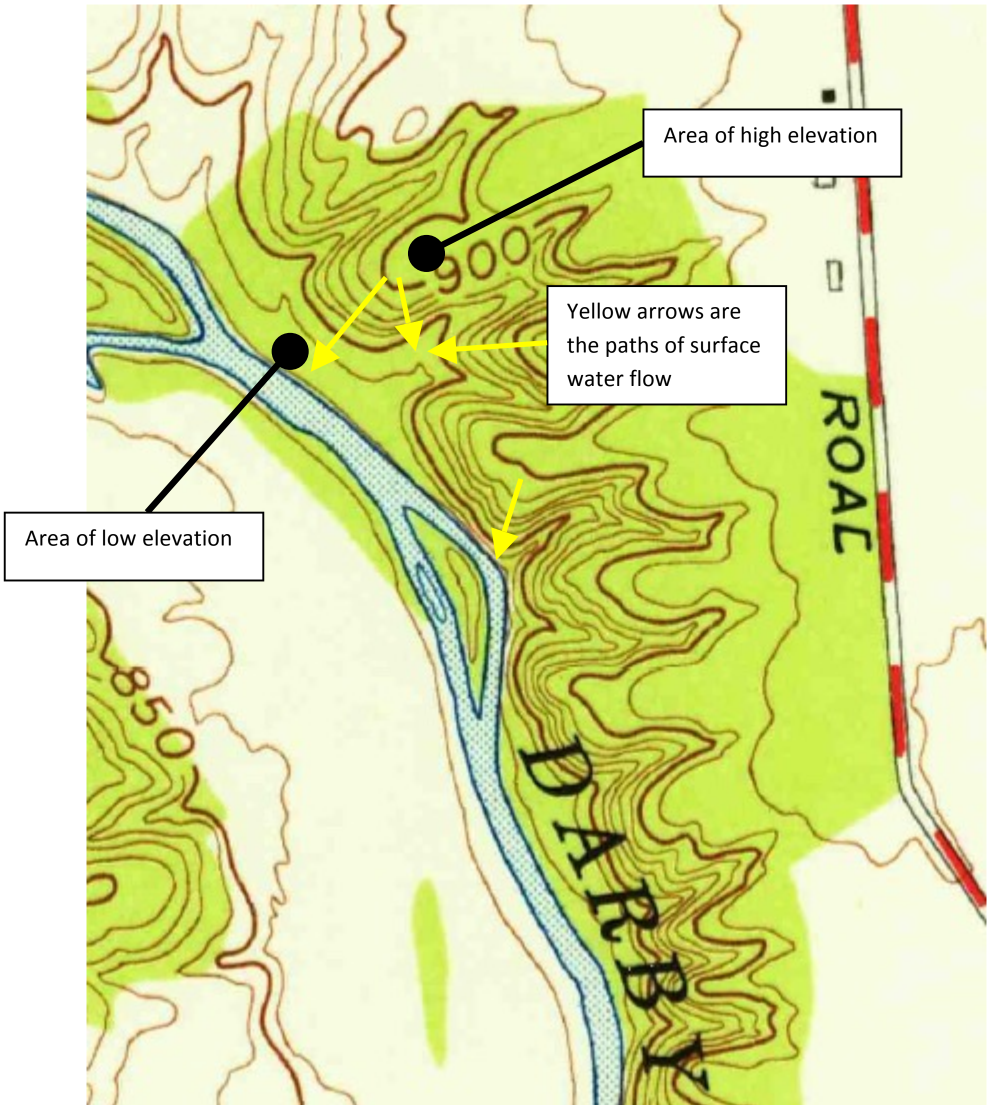
$$\text{Slope} = \frac{Change\ in\ vertical\ distance}{Change\ in\ horizontal\ distance} = \frac{Rise}{Run}$$

Contour lines that are closer together are steeper areas than areas where contour lines that are further apart

One key concept for using topographic maps to understand watersheds is that contour lines represent a change in surface elevation. Thus, **<u>the flow of surface water is always perpendicular to contour lines and down-gradient.</u>**

The <u>gradient</u> is the shortest path of flow from higher elevations to lower elevations. The path represents the slope and the direction of flow.

For example:



One feature of topographic maps that is not readily evident, but nevertheless provides critical information on surface water flow, is the direction of contour lines in relation to surface water flow. Contour lines are usually smooth, unless the topography shows an abrupt change in elevation or direction. One instance where this abrupt change occurs is when surface water flow is evident.

Contour lines that intersect streambeds always point away from the direction of flow. Another way to describe this phenomenon is that contour lines that intersect stream beds always point up-gradient.