CASE STUDY #9 - Brushy Fork Dam, Sugar Grove, West Virginia

Brushy Fork Dam is a flood control structure built by the Soil Conservation Service southeast of the city of Franklin in Pendleton County, West Virginia. On September 5, 1996, Hurricane Fran hit the coast of North Carolina and tracked its way north (see figure below). On September 8, 1996, torrential rains in eastern West Virginia and western Virginia swelled all streams and tributaries in the Potomac River drainage basin. The area around Brushy Fork dam received between 10 and 14 inches of rain (see figure below) in a very short period of time.

The figure on the left shows the storm track for Hurricane Fran. The figure on the right shows the estimated rainfall in the eastern Appalachian region associated with Hurricane Fran. The location of Brushy Fork Dam is shown in both figures. Both figures were taken from a NOAA website (http://www.hpc.ncep.noaa.gov/tropical/rain/fran1996.html).
View of the overflow spillway just north of Brushy Fork Dam taken on 9/16/1996. Construction fill material has been stripped down to bedrock by flood waters. The exposed length of 12 inch diameter culvert is approximately 10 feet long. The access road leading to the Dam is visible at the top of the photograph. Erosion in the spillway area came within a couple of feet of removing a portion of the road.

View of the overflow spillway looking to the northwest. The grey-coloured surface in the center of the photograph is exposed bedrock. Notice the “fan” of flood debris deposited to the northwest of the spillway.
View of the overflow spillway looking back to the southeast. Bedrock visible in the photograph is flat lying sandstone and shale of the Devonian Foreknobs Formation. Less than 100 feet away, the same rock unit is dipping steeply (65°) to the southeast indicating that the geological structure in this area is complex.

On the following pages, you will find a portion of the topographic map for the Brushy Fork Dam area and several questions regarding the Dam and its surroundings. Answer all questions and put annotation on the map as requested.
1. Draw a North Arrow in the Palo Alto topographic map shown in the previous page.

2. What two crucial pieces of information are missing from this map?

3. Ugly Mountain near the bottom of the map is approximately 2 miles long. Based on this, what is the scale for this map?

4. Notice the small dam near the left edge of the map. What is the purpose(s) of Dam No. 35?

5. Not shown on the map is the “infamous” Brushy Fork Dam. This dam is too new to be included on the topographic map. It is located approximately 1/4 mile northwest of the junction of Brushy Fork and Flesher creeks. The dam is approximately 80’ tall and trends northeast-southwest from wall to wall across the Brushy Fork valley. Draw in the dam on the map. Be sure you contact the proper elevations on both valley walls.

6. At maximum fill, the Brushy Fork Dam was expected to have a water level 25’ to 30’ above the valley floor. Do you see any buildings or other man-made features that might be submerged when the water reaches this level? If so, mark them on the map in red.

7. In 1996, excessive rainfall associated with Hurricane Fran filled the dam completely to the top and overflowing (water level greater than 80’ deep above valley floor). With a green arrow, mark the path that flood waters took as they escaped from the dam. Were there any buildings in danger from these floodwaters? If so, mark them in green.

8. Before escaping from the dam, water was backed up behind the dam to an elevation of 80’ above the valley floor. With the water at this elevation, were any buildings or man-made structures at risk of flooding upstream from the dam? If so, mark them in blue. HINT: use the elevation of the valley floor closest to the dam.