

### Activity 1

At this time, complete Activity 1 in the Study Guide to review the material just covered. After finishing the Activity, compare your answers with the solution provided. When you are satisfied that you understand the material, continue with the Study Guide text.

Given:

I, M. Rich, a gentlemen farmer, has requested that a farm pond be developed on his country estate so that his grandchildren can go fishing and swimming. Because of restrictions, it has been decided to make a detailed reservoir routing.

Find:

Solution

Elevation	Surface Area (ft <sup>2</sup> )	Surface Area (ac)	Average Area (ac)	Increment Storage (ac-ft)	Accum. Storage (ac-ft)
214	0	0	0	0	0
216	24,400	0.55	0.28	0.56	0.56
218	56,000	1.29	0.92	1.84	2.40
220	130,000	2.98	2.14	4.28	6.68
222	300,000	6.89	4.94	9.88	16.56
224	720,000	16.53	11.71	23.42	39.98
226	1,600,000	36.73	26.63	53.26	93.24
228	4,000,000	91.83	64.28	128.56	221.80
230	8,000,000	183.65	137.74	275.48	497.28

### Activity 2

W. E. Smith, a working farmer, needs to develop a small pond to use as a stock watering facility in Field 2. Because of the site location and its possible size, it was decided that the approximate method of estimating reservoir capacity could be used. The estimated water depth is 12 feet, the interval between measured widths is 20 feet and the summation of widths at the proposed waterline is 20,000 feet.

**Find:**

The reservoir capacity using the approximate method from the EFM.

Solution:

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$$(9.2 \text{ ac}) (12 \text{ ft})(0.4) = 44.2 \text{ A F}$$

### Activity 3

A developer is planning to develop a 640 acre area near Ames, Iowa. The contributing drainage area for the proposed storm water management structure is 320 acres. The present condition 100-year peak flow is 1200 cfs. It is estimated that with development, the 100-year peak flow would be 2800 cfs. The estimated runoff volume for the developed condition is 3.18 inches.

Find:

The required storage in acre-feet

Solution: 1.  $q_o/q_i = 1200 \text{ cfs}/2800 \text{ cfs}$   
 $= 0.43.$

2. Using Figure 6-1 (Appendix A)

$$V_s/Nr = 0.31$$

3.  $V_s = (0.31)(3.18 \text{ in}) = 0.995 \text{ in}$

$$V_s = (0.99 \text{ in})(1 \text{ ft}/12 \text{ in})(320 \text{ ac})$$

$$V_s = 26.4 \text{ ac-ft}$$

#### Activity 4

Given:

A farmer in southwestern Pennsylvania is planning to build a farm pond. The drainage area above the ponds is 38.2 acres. The 1 O-year peak flow is 85 cfs, and the runoff volume is 2.7 inches.

Find:

The required storage in acre-feet if the outflow was limited to 40 cfs.

Solution:

1.  $q_o/q_i = 40 \text{ cfs}/85 \text{ cfs} = 0.47$
2. From Figure 6-1,  $V_s/Nr = 0.29$
3.  $V_s = (0.29)(2.7 \text{ in}) = 0.78 \text{ in}$   
 $V_s = (0.78 \text{ in})(1 \text{ ft}/12 \text{ in})(38.2 \text{ ac})$   
 $V_s = 2.5 \text{ ac-ft}$