

EFFECTS OF TERRACES AND WATER & SEDIMENT CONTROL BASINS ON RUNOFF

Runoff may be adjusted for the effect of terraces in the design of many conservation practices. Terraces may have a shorter design life than some other practices so a partial credit is used. For areas that have or definitely will have closed-end terraces, the runoff may be reduced by 1.0 inch. The same considerations apply to water & sediment control basins. The adjusted runoff is computed by the use of the formula:

$$Q_a = Q - \left(\frac{\text{Area_Terraced}}{\text{Total_Drainage_Area}} \right) (1.0_inch)$$

Where :

Q = Runoff Depth, inches

Q_a = Adjusted Runoff Depth, inches

On level terraced areas, the water stored by the terrace will infiltrate into the soil and will not be considered as part of the runoff. For terraces using underground outlets that drain into the practice being designed, a base flow of 0.05 cfs per acre needs to be added to the inflow.

Peak discharge rates may be reduced by the same percentage as the reduction in runoff volume.

Many software packages are not able to directly give credit for the runoff reduction. For those situations a revised rainfall value can be calculated from the adjusted runoff depth and the runoff curve number.

Example Problem

Given:

Total Drainage Area = 225 acres

Drainage area controlled by closed-end, level terraces = 30

Drainage area controlled by terraces w/ underground outlets = 10

Total terraced area = 30 + 10 = 40 acres

Runoff Curve Number, CN = 78

Rainfall Value #1, P1 = 4.4"

Rainfall Value #2, P2 = 5.1"

Find: Adjusted Runoff Depths, Base Flow, Peak Flow reduction, Adjusted rainfall

Rainfall #1

From EFH-2, Table IA2-1, Input P=4.4 & CN =78 : Result- Runoff, Q=2.21"

$$\text{Adjusted Rainfall} = Q_a = 2.21 - \left(\frac{40}{225} \right) (1.0) = 2.03"$$

Baseflow = 10 acres * 0.05 = 0.5 cfs

$$\text{Peak Flow Reduction} = \frac{Q_a}{Q} = \frac{2.03"}{2.21"} = 91.9\%$$

From EFH-2, Table IA2-1, Input $Q_a=2.03"$ & CN =78 : Adjusted Rainfall P=4.18"

Rainfall #2

From EFH-2, Table IA2-1, Input P=5.1 & CN =78 : Result - Runoff, Q=2.8"

$$\text{Adjusted Rainfall} = Q_a = 2.8 - \left(\frac{40}{225} \right) (1.0) = 2.62''$$

$$\text{Baseflow} = 10 \text{ acres} (0.05) = 0.5 \text{ cfs}$$

$$\text{Peak Flow Reduction} = \frac{Q_a}{Q} = \frac{2.62''}{2.8''} = 93.6\%$$

From EFH-2, Table IA2-1, Input Qa=2.62" & CN =78 : Adjusted Rainfall P=4.89"

The effects of terrace and water & sediment control basins on runoff process, shown above, is available in electronic spreadsheet format (i.e.: IaTerraceCredit.xls) at <http://www.ia.nrcs.usda.gov/technical/design/program.html>