Flow Length for Natural Watershed.

For natural watersheds without structures such as terraces or diversions to change the low path of water, the flow length can be determined using the following relationship:

$$\ell = 209 \; A^{0.6} \qquad \text{(Eq. 2-5a)}$$

where

$\ell =$ Flow length in feet and
$A =$ drainage area in acres

This equation is based on data from 160 experimental small watersheds of the Agricultural Research Service. The ratio of the flow length (ℓ) to the average width (w) of these watersheds varies with drainage area as follows:

$$\ell/w = A^{0.2} \qquad \text{(Eq. 2-5b}$$

where

$\ell \;\; = \;\;$ flow length in feet,
$w \;\; = \;\;$ average width in feet, and
$A \;\; = \;\;$ drainage area in acres.

Limitations

* Where a watershed deviates significantly from the shape as expressed by Eq. N2-5b or where structures change the flow path of water, the flow length (ℓ) specific to the watershed should be determined.

Applying Pond and swamp Adjustment Factor

If pond and swamp areas are spread throughout the watershed and are not considered in the T_c computation, an adjustment for pond and swamp areas is also needed. The peak discharge equation then becomes

$$q_p = q_u A Q F_p \qquad \text{(Eq. 2-7a)}$$

where

q_p = peak discharge in cfs,
q_u = unit peak discharge in cfs/acre/inch of runoff,
A = drainage area in acres,
Q = runoff in inches, and
F_p = pond and swamp adjustment factor.

The pond and swamp adjustment factor is obtained from Table 2-5 (rounded to the nearest table value). Worksheet 2 and the EFM-2 computer program have not been supplemented to incorporate the use of the F_p factor; therefore, the adjustment must be made manually on the worksheet and computer program output.

Table 2-5. –Adjustment factor (F_p) for pond and swamp areas that are spread throughout the watershed.

Percentage of pond and swamp areas	F_p
0	1.00
0.2	0.97
1.0	0.87
3.0	0.75
5.0	0.72

Limitations
* The F_p factor can be applied only for ponds or swamps not in the T_c flow path.

* The F_p factor can be applied to the peak discharge (q_p) only, not to the runoff(Q).

*The F_p factor is an approximation of the typical effect of the storage in ponds and swamps on peak discharge.