

## HYDROLOGIC SOIL-COVER COMPLEXES

A combination of the effects of hydrologic soil group (soil) and the land use and treatment class (cover) is used to determine the runoff curve number (CN). The CN indicates the runoff potential of a soil-cover complex during periods when the soil is not frozen. The higher the CN, the higher the potential for runoff.

### Land Use

Fallow is the land use with the highest potential for runoff because the land is kept as bare as possible to conserve moisture for use by a succeeding crop.

A row crop is any field crop planted in rows far enough apart that most of the soil surface is exposed to rainfall impact during the early growing season (i.e.: corn, soybeans, sorghum).

Small grain is planted in rows close enough together that the soil surface is not exposed except during planting and shortly thereafter.

Close-seeded legumes or rotation meadow are either planted in close rows or broadcast. This cover may be allowed to remain for more than a year so that year-round protection is given to the soil.

Pasture is a long term stand of forage plants which gives year-round protection to the soil.

Meadow is a field in which grass is continually grown, protected from grazing, and generally mowed for hay.

Woods are forested areas that have at least 30 percent canopy coverage as viewed by aerial photography.

Farmsteads include the area surrounding the farm headquarters including buildings, lots, driveways, etc.

Roads are improved travelways (not farm lanes). Hard surface roads include any type of asphalt or concrete paving. Road right-of-way is included in the total road area used to determine CN.

### Treatment or Practice

Straight row fields are those farmed in straight rows either up and down hill or across the slope.

Contoured fields are those farmed as nearly as possible on the contour. The hydrologic effect of contouring is due to the surface storage provided by the furrows because the storage prolongs the time during which infiltration can take place. The magnitude of the storage depends not only on the dimensions of the furrows but also on the land slope, crop, and manner of planting and cultivation. See Contour Farming (330) in the Field Office Technical Guide for additional guidance.

The contoured and terraced condition is to be used for systems containing open-end level or graded terraces with grassed waterway outlets where all tillage is done on the contour between the terraces. The area above closed-end level terraces and terraces with tile outlets is to be included with the contoured area for runoff curve number computations.

### Hydrologic Condition

Ratings as to “poor” or “good” are based largely on the proportion of dense vegetation in the rotation.

Pasture is considered poor if it is heavily grazed and has no mulch or has plant cover on less than half of the area. Fair pasture has plant cover on 50 to 75 percent of the area. Heavily grazed pasture in Iowa is generally considered to be fair pasture. Good pasture is lightly grazed and has plant cover on more than 75 percent of the area.

Poor woods are heavily grazed or are regularly burned and have no litter or new young growth. Fair woods are grazed but not burned. There may be some litter but these woods are not protected. Good woods are protected from grazing and have litter and shrubs covering the soil.

Table IA2-1 gives CN's for agricultural land uses and for selected suburban and urban land uses.

### Effects of Conservation Tillage

Cropland with conservation tillage and residue management practices will be considered to be in good hydrologic condition.

RUNOFF CURVE NUMBERS<sup>1/</sup>  
TABLE IA2-1

| COVER TYPE | LAND USE AND TREATMENT <sup>2/</sup>               | HYDROLOGIC CONDITION <sup>3/</sup> | A    | CN | B | CN | C | CN | D | CN |
|------------|--|------------------------------------|------|----|---|----|---|----|---|----|
| 1          | <b>FULLY DEVELOPED URBAN AREAS (Veg Est)</b>       |                                    |      |    |   |    |   |    |   |    |
| 2          | Open space (Lawns, parks, etc.)                    |                                    |      |    |   |    |   |    |   |    |
| 3          | Poor condition; grass cover < 50%                  |                                    |      | 68 |   | 79 |   | 86 |   | 89 |
| 4          | Fair condition; grass cover 50% to 75%             |                                    |      | 49 |   | 69 |   | 79 |   | 84 |
| 5          | Good condition; grass cover > 75%                  |                                    |      | 39 |   | 61 |   | 74 |   | 80 |
| 6          |  |                                    |      |    |   |    |   |    |   |    |
| 7          | <b>Impervious Areas:</b>                           |                                    |      |    |   |    |   |    |   |    |
| 8          | Paved parking lots, roofs, driveways               |                                    |      | 98 |   | 98 |   | 98 |   | 98 |
| 9          |  |                                    |      |    |   |    |   |    |   |    |
| 10         | Streets and roads:                                 |                                    |      |    |   |    |   |    |   |    |
| 11         | Paved; curbs and storm sewers                      |                                    |      | 98 |   | 98 |   | 98 |   | 98 |
| 12         | Paved; open ditches (w/ right-of-way)              |                                    |      | 83 |   | 89 |   | 92 |   | 93 |
| 13         | Gravel (w/ right-of-way)                           |                                    |      | 76 |   | 85 |   | 89 |   | 91 |
| 14         | Dirt (w/ right-of-way)                             |                                    |      | 72 |   | 82 |   | 87 |   | 89 |
| 15         |  |                                    |      |    |   |    |   |    |   |    |
| 16         | <b>Urban Districts</b>                             |                                    |      |    |   |    |   |    |   |    |
|            |  | Avg % Imperv                       |      |    |   |    |   |    |   |    |
| 17         | Commercial & business                              |                                    |      | 89 |   | 92 |   | 94 |   | 95 |
| 18         | Industrial   |                                    |      | 81 |   | 88 |   | 91 |   | 93 |
| 19         |  |                                    |      |    |   |    |   |    |   |    |
| 20         | <b>Residential districts (by average lot size)</b> |                                    |      |    |   |    |   |    |   |    |
|            |  | Avg % Imperv                       |      |    |   |    |   |    |   |    |
| 21         | 1/8 acre (town houses)                             |                                    |      | 77 |   | 85 |   | 90 |   | 92 |
| 22         | 1/4 acre   |                                    |      | 61 |   | 75 |   | 83 |   | 87 |
| 23         | 1/3 acre   |                                    |      | 57 |   | 72 |   | 81 |   | 86 |
| 24         | 1/2 acre   |                                    |      | 54 |   | 70 |   | 80 |   | 85 |
| 25         | 1 acre   |                                    |      | 51 |   | 68 |   | 79 |   | 84 |
| 26         | 2 acre   |                                    |      | 46 |   | 65 |   | 77 |   | 82 |
| 27         |  |                                    |      |    |   |    |   |    |   |    |
| 28         | <b>Western Desert Urban Areas</b>                  |                                    |      |    |   |    |   |    |   |    |
| 29         | Natural desert (pervious areas only)               |                                    |      | 63 |   | 77 |   | 85 |   | 88 |
| 30         | Artificial desert landscaping                      |                                    |      | 96 |   | 96 |   | 96 |   | 96 |
| 31         |  |                                    |      |    |   |    |   |    |   |    |
| 32         | <b>User defined urban (Click button to define)</b> |                                    |      |    |   |    |   |    |   |    |
|            |  | Custom CN                          |      |    |   |    |   |    |   |    |
| 33         | % Impervious Area:                                 |                                    |      |    |   |    |   |    |   |    |
| 34         | % Unconnected Impervious Area:                     |                                    |      |    |   |    |   |    |   |    |
| 35         | Pervious Curve Number:                             |                                    |      |    |   |    |   |    |   |    |
| 36         |  |                                    |      |    |   |    |   |    |   |    |
| 37         | <b>DEVELOPING URBAN AREA (NO VEGETATION)</b>       |                                    |      |    |   |    |   |    |   |    |
| 38         | Newly graded area (pervious only)                  |                                    |      | 77 |   | 86 |   | 91 |   | 94 |
| 39         |  |                                    |      |    |   |    |   |    |   |    |
| 40         | <b>CULTIVATED AGRICULTURAL LANDS</b>               |                                    |      |    |   |    |   |    |   |    |
| 41         | Fallow   | Bare soil                          |      | 77 |   | 86 |   | 91 |   | 94 |
| 42         | Fallow   | Crop residue (CR)                  | poor | 76 |   | 85 |   | 90 |   | 93 |
| 43         | Fallow   | Crop residue (CR)                  | good | 74 |   | 83 |   | 88 |   | 90 |
| 44         |  |                                    |      |    |   |    |   |    |   |    |
| 45         | Row crop   | Straight row (SR)                  | poor | 72 |   | 81 |   | 88 |   | 91 |
| 46         |  | Straight row (SR)                  | good | 67 |   | 78 |   | 85 |   | 89 |
| 47         |  | SR + Crop residue                  | poor | 71 |   | 80 |   | 87 |   | 90 |
| 48         |  | SR + Crop residue                  | good | 64 |   | 75 |   | 82 |   | 85 |
| 49         |  | Contoured (C)                      | poor | 70 |   | 79 |   | 84 |   | 88 |
| 50         |  | Contoured (C)                      | good | 65 |   | 75 |   | 82 |   | 86 |
| 51         |  | C + Crop residue                   | poor | 69 |   | 78 |   | 83 |   | 87 |
| 52         |  | C + Crop residue                   | good | 64 |   | 74 |   | 81 |   | 85 |
| 53         |  | Cont & terraced (C&T)              | poor | 66 |   | 74 |   | 80 |   | 82 |
| 54         |  | Cont & terraced (C&T)              | good | 62 |   | 71 |   | 78 |   | 81 |
| 55         |  | C&T + Crop residue                 | poor | 65 |   | 73 |   | 79 |   | 81 |
| 56         |  | C&T + Crop residue                 | good | 61 |   | 70 |   | 77 |   | 80 |
| 57         |  |                                    |      |    |   |    |   |    |   |    |
| 58         | Small grain  | Straight row (SR)                  | poor | 65 |   | 76 |   | 84 |   | 88 |
| 59         |  | Straight row (SR)                  | good | 63 |   | 75 |   | 83 |   | 87 |
| 60         |  |                                    |      |    |   |    |   |    |   |    |

# RUNOFF CURVE NUMBERS<sup>1/</sup>

## TABLE IA2-1

| COVER TYPE | LAND USE AND TREATMENT <sup>2/</sup>         |                 | HYDROLOGIC CONDITION <sup>3/</sup> | A                | CN                | B    | CN | C  | CN | D  | CN |
|------------|--|-----------------|------------------------------------|------------------|-------------------|------|----|----|----|----|----|
|            |  |                 |                                    | 61               | SR + Crop residue | poor |    | 64 |    | 75 |    |
| 62         | SR + Crop residue                            | good            |                                    | 60               |                   | 72   |    | 80 |    | 84 |    |
| 63         | Contoured (C)                                | poor            |                                    | 63               |                   | 74   |    | 82 |    | 85 |    |
| 64         | Contoured (C)                                | good            |                                    | 61               |                   | 73   |    | 81 |    | 84 |    |
| 65         | C + Crop residue                             | poor            |                                    | 62               |                   | 73   |    | 81 |    | 84 |    |
| 66         | C + Crop residue                             | good            |                                    | 60               |                   | 72   |    | 80 |    | 83 |    |
| 67         | Cont & terraced (C&T)                        | poor            |                                    | 61               |                   | 72   |    | 79 |    | 82 |    |
| 68         | Cont & terraced (C&T)                        | good            |                                    | 59               |                   | 70   |    | 78 |    | 81 |    |
| 69         | C&T + Crop residue                           | poor            |                                    | 60               |                   | 71   |    | 78 |    | 81 |    |
| 70         | C&T + Crop residue                           | good            |                                    | 58               |                   | 69   |    | 77 |    | 80 |    |
| 71         |  |                 |                                    |                  |                   |      |    |    |    |    |    |
| 72         | Close-seeded Straight Row                    | poor            |                                    | 66               |                   | 77   |    | 85 |    | 89 |    |
| 73         | legumes or Straight Row                      | good            |                                    | 58               |                   | 72   |    | 81 |    | 85 |    |
| 74         | rotation Contoured                           | poor            |                                    | 64               |                   | 75   |    | 83 |    | 85 |    |
| 75         | meadow Contoured                             | good            |                                    | 55               |                   | 69   |    | 78 |    | 83 |    |
| 76         |  | Cont & terraced | poor                               | 63               |                   | 73   |    | 80 |    | 83 |    |
| 77         |  | Cont & terraced | good                               | 51               |                   | 67   |    | 76 |    | 80 |    |
| 78         |  |                 |                                    |                  |                   |      |    |    |    |    |    |
| 79         | <b>OTHER AGRICULTURAL LANDS</b>              |                 |                                    |                  |                   |      |    |    |    |    |    |
| 80         | Pasture, grassland or range <sup>4/</sup>    | poor            |                                    | 68               |                   | 79   |    | 86 |    | 89 |    |
| 81         | Pasture, grassland or range                  | fair            |                                    | 49               |                   | 69   |    | 79 |    | 84 |    |
| 82         | Pasture, grassland or range                  | good            |                                    | 39               |                   | 61   |    | 74 |    | 80 |    |
| 83         |  |                 |                                    |                  |                   |      |    |    |    |    |    |
| 84         | Meadow - cont. grass (non grazed)            |                 |                                    | 30               |                   | 58   |    | 71 |    | 78 |    |
| 85         |  |                 |                                    |                  |                   |      |    |    |    |    |    |
| 86         | Brush - brush, weed, grass mix <sup>5/</sup> | poor            |                                    | 48               |                   | 67   |    | 77 |    | 83 |    |
| 87         | Brush - brush, weed, grass mix               | fair            |                                    | 35               |                   | 56   |    | 70 |    | 77 |    |
| 88         | Brush - brush, weed, grass mix               | good            |                                    | 30 <sup>6/</sup> |                   | 48   |    | 65 |    | 73 |    |
| 89         |  |                 |                                    |                  |                   |      |    |    |    |    |    |
| 90         | Woods - grass combination <sup>7/</sup>      | poor            |                                    | 57               |                   | 73   |    | 82 |    | 86 |    |
| 91         | Woods - grass combination                    | fair            |                                    | 43               |                   | 65   |    | 76 |    | 82 |    |
| 92         | Woods - grass combination                    | good            |                                    | 32               |                   | 58   |    | 72 |    | 79 |    |
| 93         |  |                 |                                    |                  |                   |      |    |    |    |    |    |
| 94         | Woods <sup>8/</sup>                          | poor            |                                    | 45               |                   | 66   |    | 77 |    | 83 |    |
| 95         | Woods  | fair            |                                    | 36               |                   | 60   |    | 73 |    | 79 |    |
| 96         | Woods  | good            |                                    | 30               |                   | 55   |    | 70 |    | 77 |    |
| 97         |  |                 |                                    |                  |                   |      |    |    |    |    |    |
| 98         | Farmsteads                                   | ---             |                                    | 59               |                   | 74   |    | 82 |    | 86 |    |
| 99         | Feedlots                                     |                 |                                    |                  |                   |      |    |    |    |    |    |
| 100        | Earthen                                      | ---             |                                    | 90               |                   | 90   |    | 90 |    | 90 |    |
| 101        | Paved  |                 |                                    | 98               |                   | 98   |    | 98 |    | 98 |    |

<sup>1/</sup> Average runoff condition, and I<sub>a</sub>=0.2s.

<sup>2/</sup> Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

<sup>3/</sup> Hydrologic condition is based on combinations of factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥20%), and (e) degree of surface toughness.

Poor: factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

For conservation tillage poor hydrologic condition, 5 to 20% of the surface is covered with residue (less than 750 pounds per acre for row crops or 300 pounds per acre for small grain).

For conservation tillage good hydrologic condition, more than 20% of the surface is covered with residue (greater than 750 pounds per acre for row crops or 300 pounds per acre for small grain).

<sup>4/</sup> Poor: <50% ground cover or heavily grazed with no mulch.

Fair: 50 to 75% ground cover and not heavily grazed.

Good: >75% ground cover and lightly or only occasionally grazed.

<sup>5/</sup> Poor: <50% ground cover.

Fair: 50 to 75% ground cover.

Good: >75% ground cover.

<sup>6/</sup> If actual curve number is less than 30, use CN = 30 for runoff computation.

<sup>7/</sup> CNs shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CNs for woods and pasture.

<sup>8/</sup> Poor: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.

Fair: Woods are grazed, but not burned, and some forest litter covers the soil.

Good: Woods are protected from grazing, and litter and brush adequately cover the soil.