Important Runoff Density and Form Factor Formulas PDF

Formulas
Examples
with Units

List of 17
Important Runoff Density and Form Factor Formulas

1) Drainage Density Formulas

1.1) Catchment Area given Drainage Density Formula

Evaluate Formula

Formula

$$A_{catchment} = \frac{L_s}{D_d}$$

Example with Units

$$2\,\text{m}^2 = \frac{80\,\text{km}}{40}$$

1.2) Drainage Density Formula

Evaluate Formula

Formula

$$D_d = \frac{L_s}{A_{catchment}}$$

Example with Units

$$40 = \frac{80\,\text{km}}{2.0\,\text{m}^2}$$

1.3) Length of all Streams given Drainage Density Formula

Evaluate Formula

Formula

$$L_s = D_d \cdot A_{catchment}$$

Example with Units

$$80\,\text{km} = 40 \cdot 2.0\,\text{m}^2$$

2) Form Factors Formulas

2.1) Aerial Length of Basin given Form Factor Formula

Evaluate Formula

Formula

$$L_b = \frac{W_b}{F_f}$$

Example with Units

$$30\,\text{m} = \frac{0.24\,\text{m}}{0.008}$$

2.2) Form Factor given Shape Factor Formula

Evaluate Formula

Formula

$$F_f = \frac{1}{B_s}$$

Example

$$0.0008 = \frac{1}{1250}$$

2.3) Form Factor given Width of Basin Formula

Evaluate Formula

Formula

$$F_f = \frac{W_b}{L_b}$$

Example with Units

$$0.008 = \frac{0.24\,\text{m}}{30\,\text{m}}$$

2.4) Form Factor using Watershed Dimensions Formula

Evaluate Formula

Formula

$$F_f = \frac{A}{L^2}$$

Example with Units

$$0.008 = \frac{20\,\text{m}^2}{50\,\text{m}^2}$$

2.5) Shape Factor given Watershed Length Formula

Evaluate Formula

Formula

$$B_s = \frac{(L)^2}{A_{catchment}}$$

Example with Units

$$1250 = \frac{(50\,\text{m})^2}{2.0\,\text{m}^2}$$

2.6) Watershed Area given Form Factor Formula

Evaluate Formula

Formula

$$A = F_f \cdot L^2$$

Example with Units

$$20\,\text{m}^2 = 0.008 \cdot 50\,\text{m}^2$$

2.7) Watershed Area given Shape Factor Formula

Evaluate Formula

Formula

$$A = \frac{L^2}{B_s}$$

Example with Units

$$2\,\text{m}^2 = \frac{50\,\text{m}^2}{1250}$$

2.8) Watershed Length given Form Factor Formula

Evaluate Formula

Formula

$$L = \left(\frac{A}{F_f}\right)^{\frac{1}{2}}$$

Example with Units

$$50\,\text{m} = \left(\frac{20\,\text{m}^2}{0.008}\right)^{\frac{1}{2}}$$

2.9) Watershed Length given Shape Factor Formula

Evaluate Formula

Formula

$$L = \sqrt{B_s \cdot A_{catchment}}$$

Example with Units

$$50\,\text{m} = \sqrt{1250 \cdot 2.0\,\text{m}^2}$$

2.10) Width of Basin given Form Factor Formula

Evaluate Formula

Formula

$$W_b = F_f \cdot L_b$$

Example with Units

$$0.24\,\text{m} = 0.008 \cdot 30\,\text{m}$$

3) Stream Density Formulas

3.1) Catchment Area given Stream Density Formula

Evaluate Formula

Formula

$$A_{catchment} = \frac{Ns}{D_s}$$

Example with Units

$$2\,m^2 = \frac{12}{6}$$

3.2) Length of Overland Flow Formula

Evaluate Formula

Formula

$$L_o = \left(\frac{1}{2}\right) \cdot D_s$$

Example with Units

$$3\,m = \left(\frac{1}{2}\right) \cdot 6$$

3.3) Number of Streams given Stream Density Formula

Evaluate Formula

Formula

$$Ns = D_s \cdot A_{catchment}$$

Example with Units

$$12 = 6 \cdot 2.0\,m^2$$

3.4) Stream Density Formula

Evaluate Formula

Formula

$$D_s = \frac{Ns}{A_{catchment}}$$

Example with Units

$$6 = \frac{12}{2.0\,m^2}$$

Variables used in list of Runoff Density and Form Factor Formulas above

- **A** Watershed Area *(Square Meter)*
- $A_{catchment}$ Catchment Area *(Square Meter)*
- B_s Shape Factor
- D_d Drainage Density
- D_s Stream Density
- F_f Form Factor
- **L** Watershed Length *(Meter)*
- L_b Length of Basin *(Meter)*
- L_o Length of Overland Flow *(Meter)*
- L_s Length of all Streams of Catchment *(Kilometer)*
- **Ns** Number of Streams
- W_b Width of Basin *(Meter)*

Constants, Functions, Measurements used in list of Runoff Density and Form Factor Formulas above

- Functions: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Length** in Kilometer (km), Meter (m)
  Length Unit Conversion
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion

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