Important Groundwater Level Fluctuation Formulas PDF

Formulas
Examples
with Units

List of 21
Important Groundwater Level Fluctuation Formulas

1) Base Flow when Possible Recharge is Considered Formula

Evaluate Formula

Formula

$$B = R_G - R + I + I_s$$

Example with Units

$$5\,\text{m}^3/\text{s} = 45\,\text{m}^3/\text{s} - 70\,\text{m}^3/\text{s} + 12\,\text{m}^3/\text{s} + 18\,\text{m}^3/\text{s}$$

2) Catchment Area usually Watershed Area when Possible Recharge is Considered Formula

Evaluate Formula

Formula

$$A = \frac{R + D_G}{h} \cdot S_Y$$

Example with Units

$$9.44\,\text{m}^2 = \frac{70\,\text{m}^3/\text{s} + 10\,\text{m}^3/\text{s}}{5\,\text{m}} \cdot 0.59$$

3) Equation for Base Flow into Stream from Area Formula

Evaluate Formula

Formula

$$B = R_G - D_G + I_s + I - \left(h \cdot S_Y \cdot A\right)$$

Example with Units

$$6\,\text{m}^3/\text{s} = 45\,\text{m}^3/\text{s} - 10\,\text{m}^3/\text{s} + 18\,\text{m}^3/\text{s} + 12\,\text{m}^3/\text{s} - \left(5\,\text{m} \cdot 0.59 \cdot 20\,\text{m}^2\right)$$

4) Equation for Gross Recharge due to Rainfall and other Sources Formula

Evaluate Formula

Formula

$$R_G = \left(h \cdot S_Y \cdot A\right) + D_G + B - I_s - I$$

Example with Units

$$45\,\text{m}^3/\text{s} = \left(5\,\text{m} \cdot 0.59 \cdot 20\,\text{m}^2\right) + 10\,\text{m}^3/\text{s} + 6\,\text{m}^3/\text{s} - 18\,\text{m}^3/\text{s} - 12\,\text{m}^3/\text{s}$$

5) Equation for Gross Water Draft Formula

Evaluate Formula

Formula

$$D_G = R_G - B + I_s + I - \left(h \cdot S_Y \cdot A\right)$$

Example with Units

$$10\,\text{m}^3/\text{s} = 45\,\text{m}^3/\text{s} - 6\,\text{m}^3/\text{s} + 18\,\text{m}^3/\text{s} + 12\,\text{m}^3/\text{s} - \left(5\,\text{m} \cdot 0.59 \cdot 20\,\text{m}^2\right)$$

6) Equation for Net Ground Water Flow into Area across Boundary Formula

Evaluate Formula

Formula

$$I = \left(h \cdot S_Y \cdot A \right) - R_G + D_G + B - I_s$$

Example with Units

$$12\,\text{m}^3/\text{s} = \left(5\,\text{m} \cdot 0.59 \cdot 20\,\text{m}^2 \right) - 45\,\text{m}^3/\text{s} + 10\,\text{m}^3/\text{s} + 6\,\text{m}^3/\text{s} - 18\,\text{m}^3/\text{s}$$

7) Equation for Recharge from Irrigation in Area Formula

Evaluate Formula

Formula

$$R_{gw} = R - R_{rf} - R_{wt} - R_t$$

Example with Units

$$19\,\text{m}^3/\text{s} = 70\,\text{m}^3/\text{s} - 16\,\text{m}^3/\text{s} - 21\,\text{m}^3/\text{s} - 14\,\text{m}^3/\text{s}$$

8) Equation for Recharge from Rainfall Formula

Evaluate Formula

Formula

$$R_{rf} = R - R_{gw} - R_{wt} - R_t$$

Example with Units

$$16\,\text{m}^3/\text{s} = 70\,\text{m}^3/\text{s} - 19\,\text{m}^3/\text{s} - 21\,\text{m}^3/\text{s} - 14\,\text{m}^3/\text{s}$$

9) Equation for Recharge from Stream into Ground Water Body Formula

Evaluate Formula

Formula

$$I_s = \left(h \cdot A \cdot S_Y \right) - R_G + D_G + B - I$$

Example with Units

$$18\,\text{m}^3/\text{s} = \left(5\,\text{m} \cdot 20\,\text{m}^2 \cdot 0.59 \right) - 45\,\text{m}^3/\text{s} + 10\,\text{m}^3/\text{s} + 6\,\text{m}^3/\text{s} - 12\,\text{m}^3/\text{s}$$

10) Equation for Recharge from Tanks and Ponds Formula

Evaluate Formula

Formula

$$R_t = R - R_{rf} - R_{gw} - R_{wt}$$

Example with Units

$$14\,\text{m}^3/\text{s} = 70\,\text{m}^3/\text{s} - 16\,\text{m}^3/\text{s} - 19\,\text{m}^3/\text{s} - 21\,\text{m}^3/\text{s}$$

11) Equation for Recharge from Water Conservation Structures Formula

Evaluate Formula

Formula

$$R_{wt} = R - R_{rf} - R_{gw} - R_t$$

Example with Units

$$21\,\text{m}^3/\text{s} = 70\,\text{m}^3/\text{s} - 16\,\text{m}^3/\text{s} - 19\,\text{m}^3/\text{s} - 14\,\text{m}^3/\text{s}$$

12) Equation for Recharge when Gross Water Draft is Considered Formula

Evaluate Formula

Formula

$$R = \left(h \cdot S_Y \cdot A \right) - D_G$$

Example with Units

$$49\,\text{m}^3/\text{s} = \left(5\,\text{m} \cdot 0.59 \cdot 20\,\text{m}^2 \right) - 10\,\text{m}^3/\text{s}$$

13) Equation for Specific Yield Formula

Evaluate Formula

Formula

$$S_Y = \frac{R_G - D_G - B + I_s + I}{A \cdot h}$$

Example with Units

$$0.59 = \frac{45\,\text{m}^3/\text{s} - 10\,\text{m}^3/\text{s} - 6\,\text{m}^3/\text{s} + 18\,\text{m}^3/\text{s} + 12\,\text{m}^3/\text{s}}{20\,\text{m}^2 \cdot 5\,\text{m}}$$

14) Equation for Water Level Fluctuation Formula

Evaluate Formula

Formula

$$h = \frac{R_G - D_G - B + I_s + I}{A \cdot S_Y}$$

Example with Units

$$5\,\text{m} = \frac{45\,\text{m}^3/\text{s} - 10\,\text{m}^3/\text{s} - 6\,\text{m}^3/\text{s} + 18\,\text{m}^3/\text{s} + 12\,\text{m}^3/\text{s}}{20\,\text{m}^2 \cdot 0.59}$$

15) Equation for Watershed Area about Specific Yield and Water Level Fluctuation Formula

Evaluate Formula

Formula

$$A = \frac{R_G - D_G - B + I_s + I}{S_Y \cdot h}$$

Example with Units

$$20\,\text{m}^2 = \frac{45\,\text{m}^3/\text{s} - 10\,\text{m}^3/\text{s} - 6\,\text{m}^3/\text{s} + 18\,\text{m}^3/\text{s} + 12\,\text{m}^3/\text{s}}{0.59 \cdot 5\,\text{m}}$$

16) Net Ground Water Flow given Possible Recharge Formula

Evaluate Formula

Formula

$$I = R - R_G + B - I_s$$

Example with Units

$$13\,\text{m}^3/\text{s} = 70\,\text{m}^3/\text{s} - 45\,\text{m}^3/\text{s} + 6\,\text{m}^3/\text{s} - 18\,\text{m}^3/\text{s}$$

17) Possible Recharge given Gross Recharge due to Rainfall Formula

Evaluate Formula

Formula

$$R = R_G - B + I + I_s$$

Example with Units

$$69\,\text{m}^3/\text{s} = 45\,\text{m}^3/\text{s} - 6\,\text{m}^3/\text{s} + 12\,\text{m}^3/\text{s} + 18\,\text{m}^3/\text{s}$$

18) Possible Recharge given other Recharge Factors Formula

Evaluate Formula

Formula

$$R = R_{rf} + R_{gw} + R_{wt} + R_t$$

Example with Units

$$70\,\text{m}^3/\text{s} = 16\,\text{m}^3/\text{s} + 19\,\text{m}^3/\text{s} + 21\,\text{m}^3/\text{s} + 14\,\text{m}^3/\text{s}$$

19) Recharge from Stream into Ground water Body given Possible Recharge Formula

Evaluate Formula

Formula

$$I_s = R - R_G + B - I$$

Example with Units

$$19\,\text{m}^3/\text{s} = 70\,\text{m}^3/\text{s} - 45\,\text{m}^3/\text{s} + 6\,\text{m}^3/\text{s} - 12\,\text{m}^3/\text{s}$$

20) Specific Yield when Possible Recharge and Gross Water Draft is Considered Formula

Evaluate Formula

Formula

$$S_Y = \frac{R + D_G}{h \cdot A}$$

Example with Units

$$0.8 = \frac{70\,\text{m}^3/\text{s} + 10\,\text{m}^3/\text{s}}{5\,\text{m} \cdot 20\,\text{m}^2}$$

21) Water Level Fluctuation when Possible Recharge and Gross Water Draft is Considered Formula

Evaluate Formula

Formula

$$h = \frac{R + D_G}{S_Y \cdot A}$$

Example with Units

$$6.7797\,\text{m} = \frac{70\,\text{m}^3/\text{s} + 10\,\text{m}^3/\text{s}}{0.59 \cdot 20\,\text{m}^2}$$

Variables used in list of Groundwater Level Fluctuation Formulas above

- **A** Watershed Area *(Square Meter)*
- **B** Base Flow into the Stream from the Area *(Cubic Meter per Second)*
- D_G Gross Water Draft *(Cubic Meter per Second)*
- **h** Water Level Fluctuation *(Meter)*
- **I** Net Ground Water Flowing Outside Catchment *(Cubic Meter per Second)*
- I_s Recharge of Ground Water Body *(Cubic Meter per Second)*
- **R** Possible Recharge *(Cubic Meter per Second)*
- R_G Gross Recharge due to Rainfall *(Cubic Meter per Second)*
- R_{gw} Recharge from Irrigation *(Cubic Meter per Second)*
- R_{rf} Recharge from Rainfall *(Cubic Meter per Second)*
- R_t Recharge from Tanks and Ponds *(Cubic Meter per Second)*
- R_{wt} Recharge from Conservation Structures *(Cubic Meter per Second)*
- S_Y Specific Yield

Constants, Functions, Measurements used in list of Groundwater Level Fluctuation Formulas above

- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Area** in Square Meter (m^2)
  Area Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s)
  Volumetric Flow Rate Unit Conversion

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