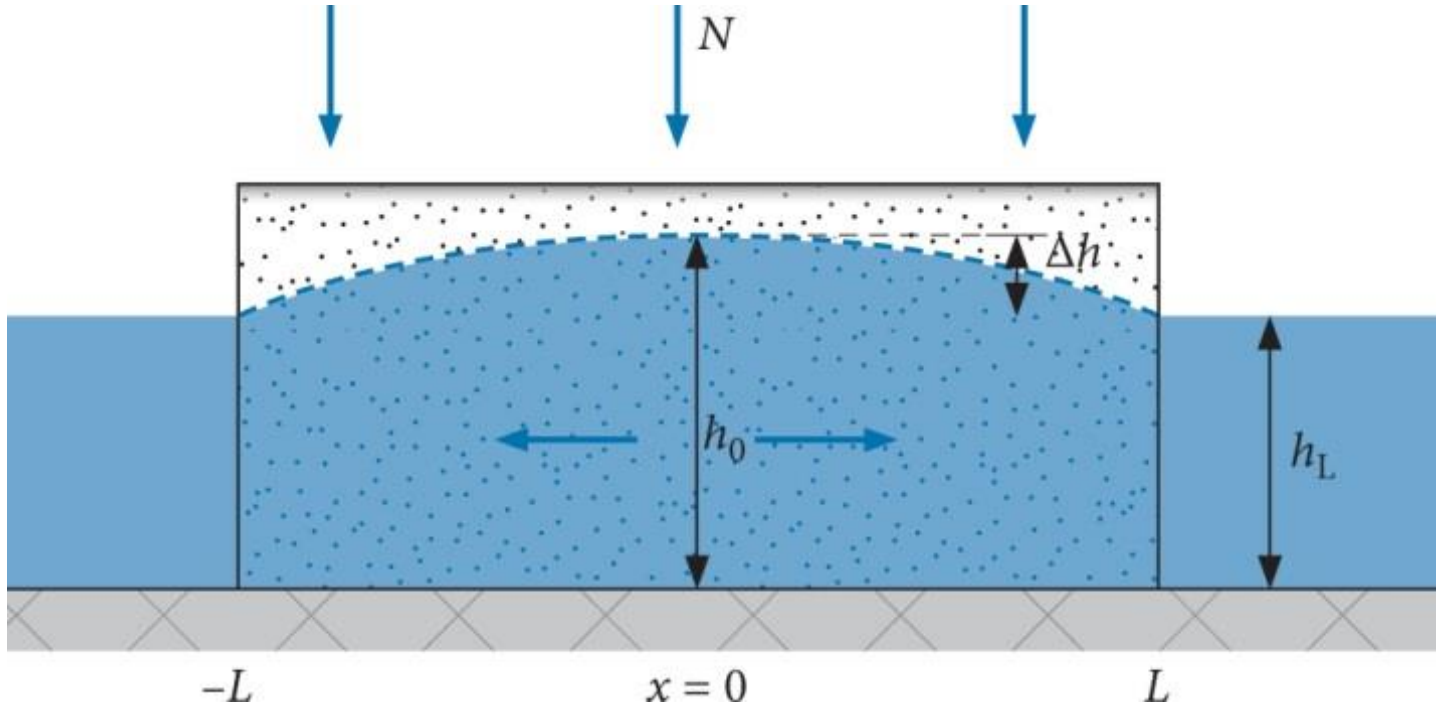
Unconfined aquifer with recharge

https://www.youtube.com/user/MartinRHendriks/videos



$$Q' = -Kh\frac{dh}{dx} \qquad Q' = Nx \qquad h^2 = -\frac{N}{K}x^2 + C$$

~ Hooghoudt equation

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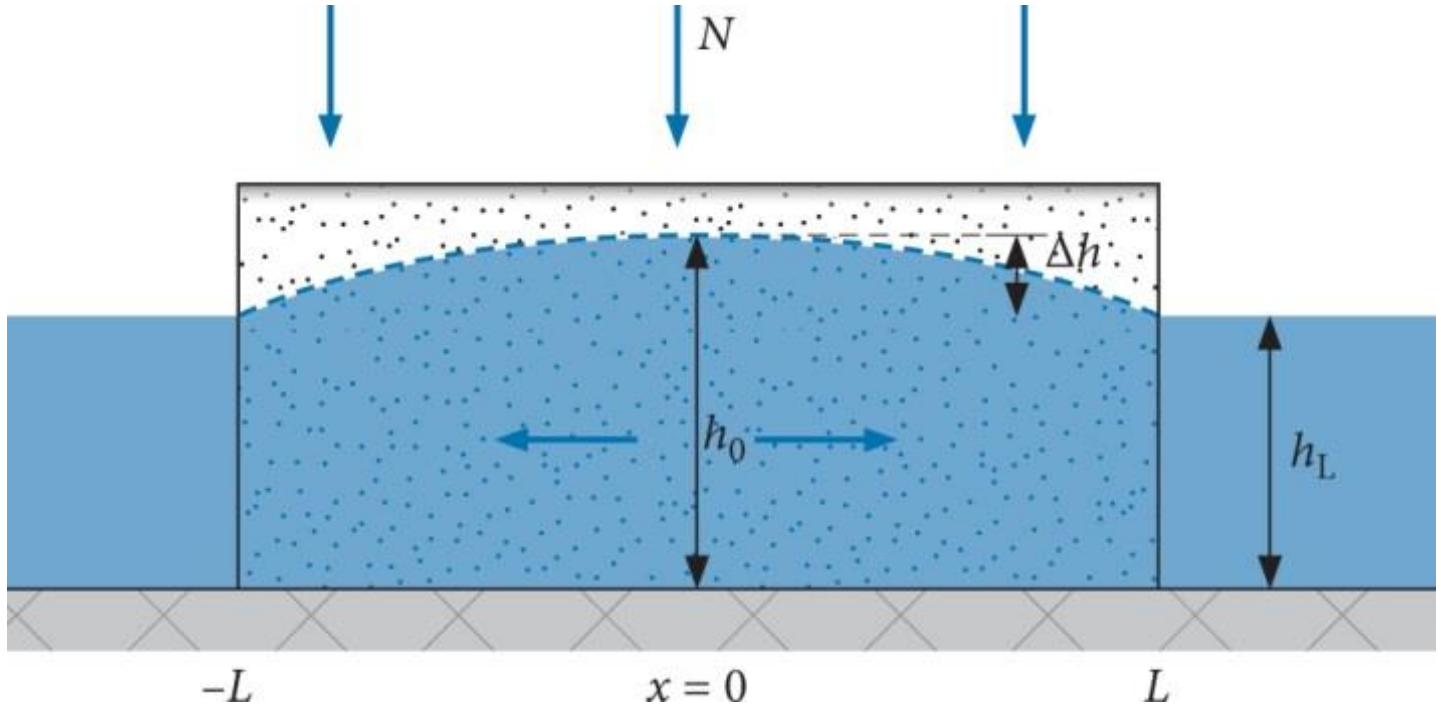

$$\Delta h = h_0 - h_L \qquad \overline{D} = \frac{h_0 + h_L}{2} \qquad N = \frac{\Delta h}{\left(\frac{L^2}{2K\overline{D}}\right)}$$

$$h_0^2 - h_L^2 = \left(h_0 + h_L\right)\left(h_0 - h_L\right)$$

Drain spacing 2*L*

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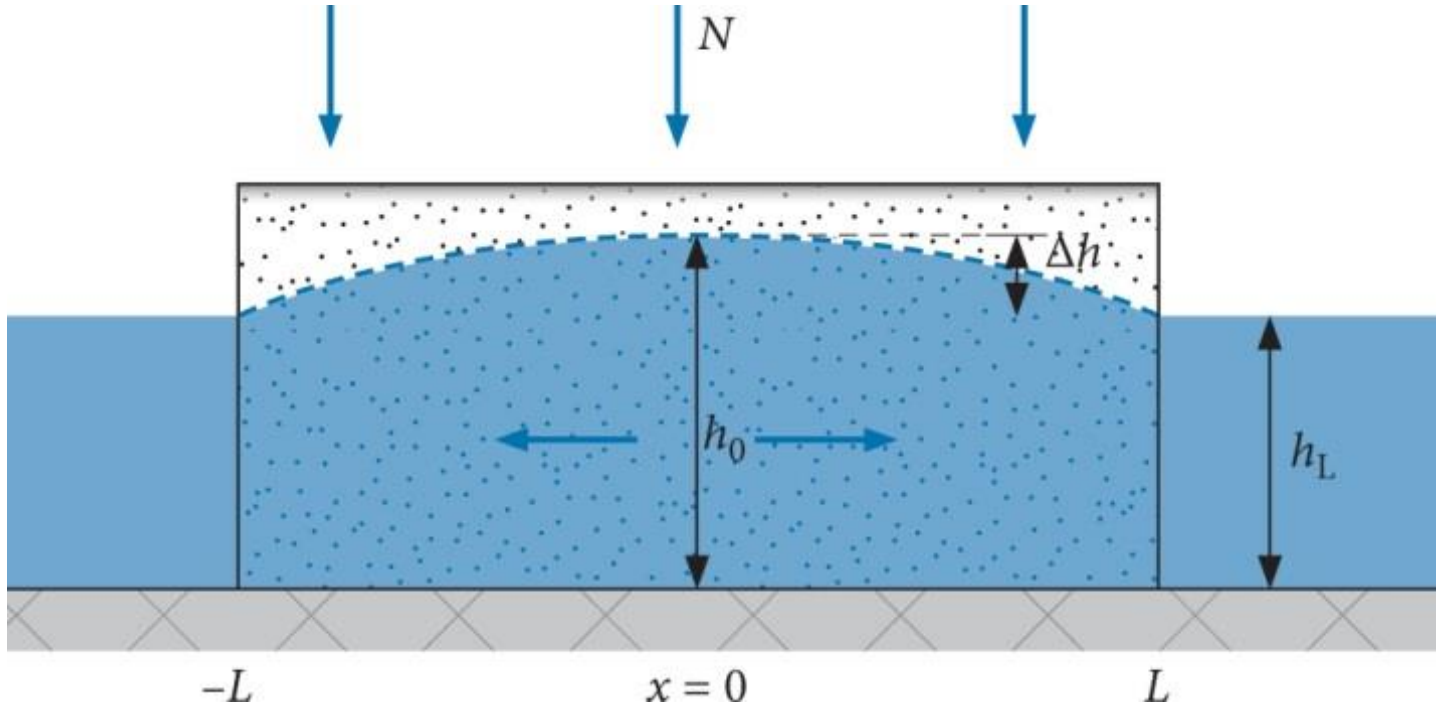

$$N = \frac{\Delta h}{\left(\frac{L^2}{2K\overline{D}}\right)}$$

$$2L = 2\sqrt{\frac{2K\overline{D}\,\Delta h}{N}}$$

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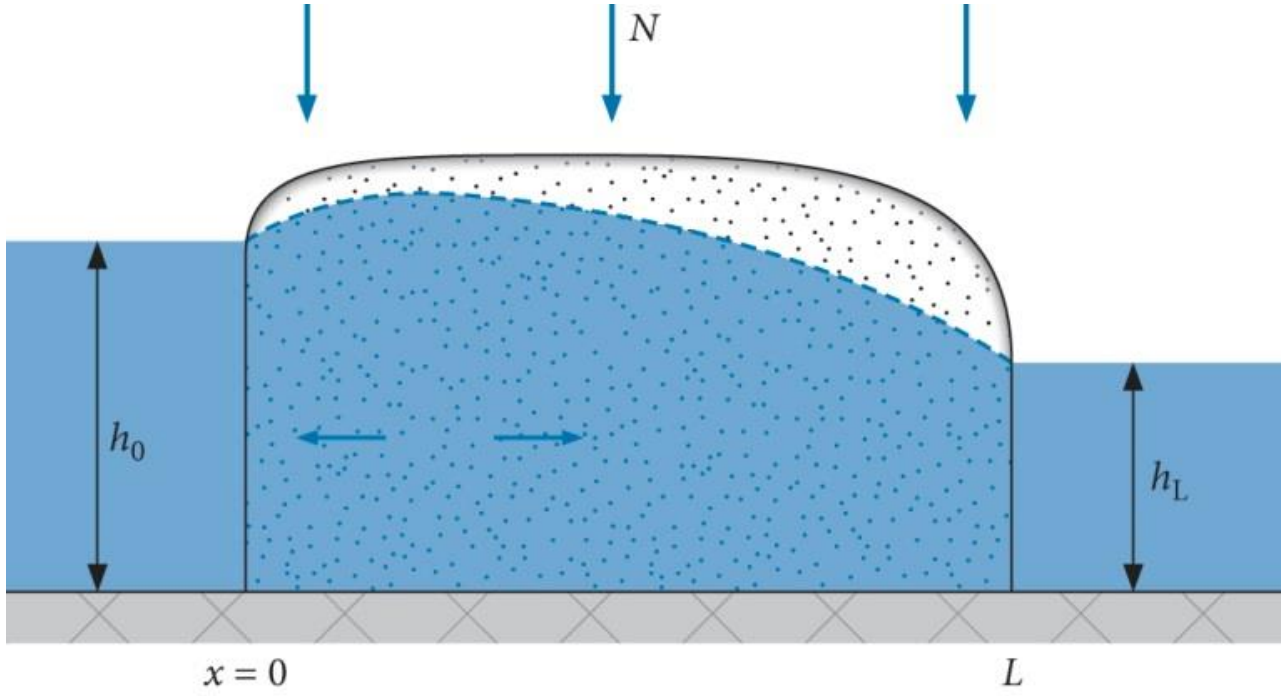

$$Q'_x = -K\left(h\frac{dh}{dx}\right)_x \qquad Q'_{x+\Delta x} = -K\left(h\frac{dh}{dx}\right)_{x+\Delta x} \qquad Q'_{x+\Delta x} - Q'_x = -K\frac{d\left(h\frac{dh}{dx}\right)}{dx}\Delta x$$

$$Q'_{x+\Delta x} - Q'_x = N\Delta x \qquad h^2 = -\frac{N}{K}x^2 + C_1 x + C_2$$

Extra resistance(s)

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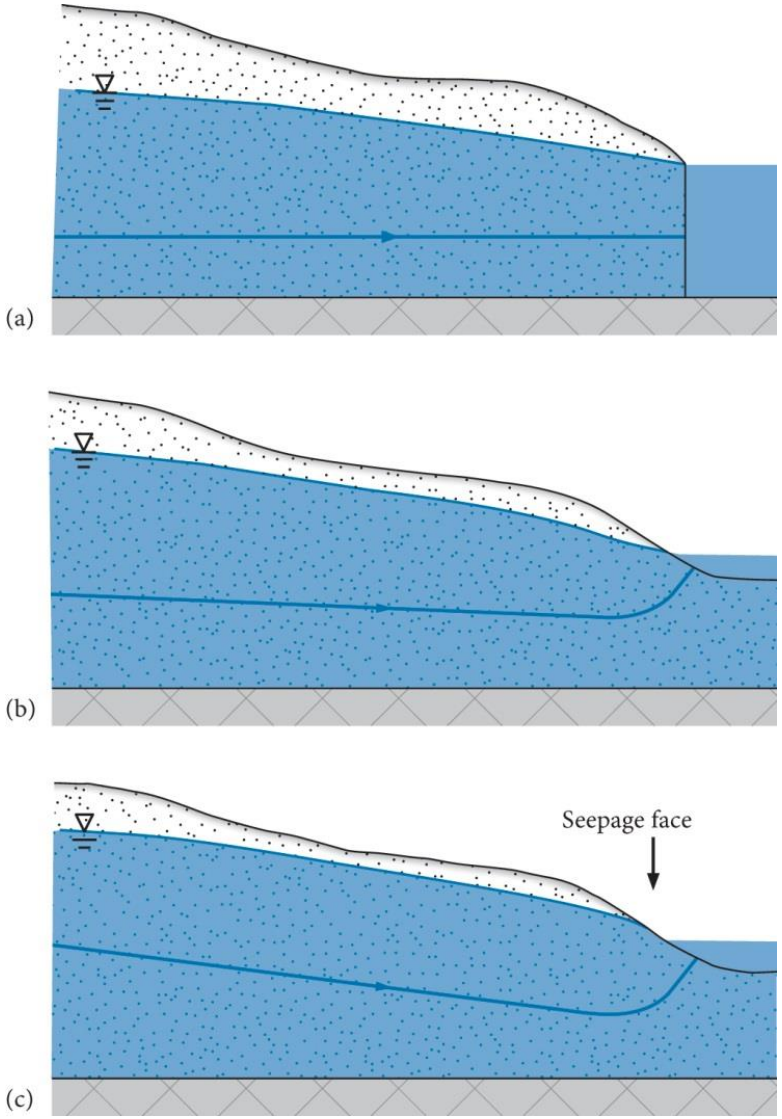

$$N = \frac{\Delta h}{\left(\frac{L^2}{2K\overline{D}} \right)}$$

$$N = \frac{\Delta h}{\left(\frac{L^2}{2K\overline{D}} + \Omega_N \right)}$$

Extra resistance(s)

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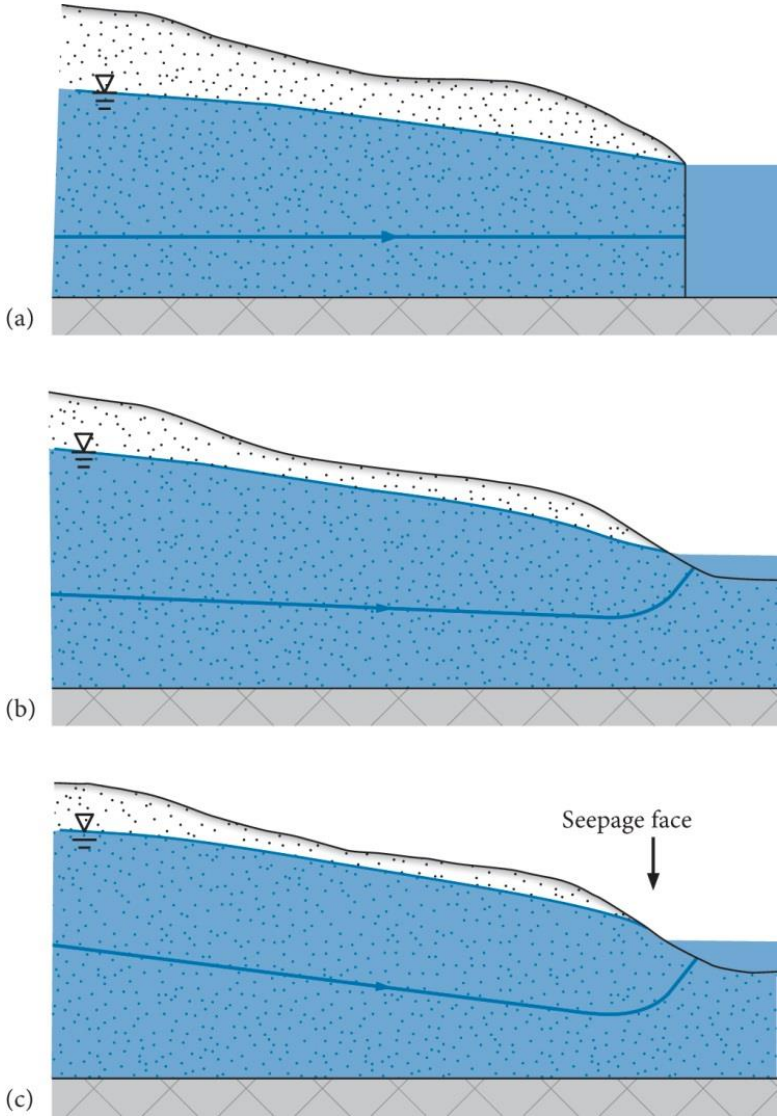

$$h^2 = -\frac{N}{K}x^2 + C$$

$$N = \frac{\Delta h}{\left(\frac{L^2}{2K\bar{D}}\right)}$$

$$2L = 2\sqrt{\frac{2K\bar{D}\Delta h}{N}}$$

$$N = \frac{\Delta h}{\left(\frac{L^2}{2K\bar{D}} + \Omega_N\right)}$$

References

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Haitjema, H.M. (1995). Analytical Element Modeling of Groundwater Flow. San Diego, CA, Academic Press, 394 pp.

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