For radial flow the drawdown is expressed as:

$$\Delta h = \frac{RB^2}{8KH} + \frac{2.3Q}{2\pi KH} log \frac{L}{\pi r_w}$$

Where Q, R, B and L are as above, and:

- K = hydraulic conductivity of the aquifer (m/d)
- H = saturated thickness of the aquifer before pumping (m)
- Δh = drawdown due to flow towards the pumped well (m)
- r_w = radius of well (m)

The equation can be used to calculate the head loss in a well field when the wells form a rectangular pattern. Such a pattern is recommended when surface drains running in parallel lines are proposed or already exist in the drainage area.

5.9.4. Semi-Confined Aquifers

A semi-confined aquifer, whose overlying layer is an aquitard, is replenished by percolating rain or excess irrigation water. Depending on the recharge rate and the hydraulic resistance of the aquitard, a difference in head between the free water table in the aquitard and the piezometric level of the aquifer will develop.

Equations for both triangular and rectangular pattern placement may be used to calculate the head loss in a well field.

Well Distance Calculation Procedure

An operating factor (the number of hours of tubewell operation in a 24 hour period) and the discharge rate determine how much water will be pumped by one tubewell. In combination with the drainable surplus (the annual discharge required to maintain the design water-level criteria), they determine the drainage area per tubewell and thus also the number of tube wells required for the total drainage area. This can be expressed in the following equation:

$$A_w = \frac{0.1Qt_w}{q}$$

Where:

A_w = drainage area per well (ha)

Q = discharge rate of the well (m^3/d)

q = drainable surplus (mm/d)

t_w = $\mathbf{t_w}$ = tubewell operating factor (-)

The total number of wells required can then be found by dividing the total drainage area per tubewell.

Well Field Configuration

For a triangular well field configuration, the distance between the wells for a selected discharge rate can be calculated by:

$$L = 100\sqrt{\frac{3A_w}{\pi}}$$