

CHAPTER 3

SOURCES OF URBAN WATER SUPPLY

Sources of urban water supplies can be classified into two groups:

- Groundwater
- Surface water

GROUNDWATER

- Springs
- Shallow aquifers
- Deep aquifers
- Salt water intrusion

SURFACE WATER

- Rainwater
- River water
- Lakes & ponds
- Impounded reservoirs
- Sea water

GROUNDWATER

The flows of groundwater can be confined or unconfined.

Confined: If the aquifer underlies an impervious stratum, flow is confined, which is similar to flow of water in a pipe under pressure (ex.:artesian).

Unconfined: When the level of groundwater is free to rise and fall, flow is unconfined.

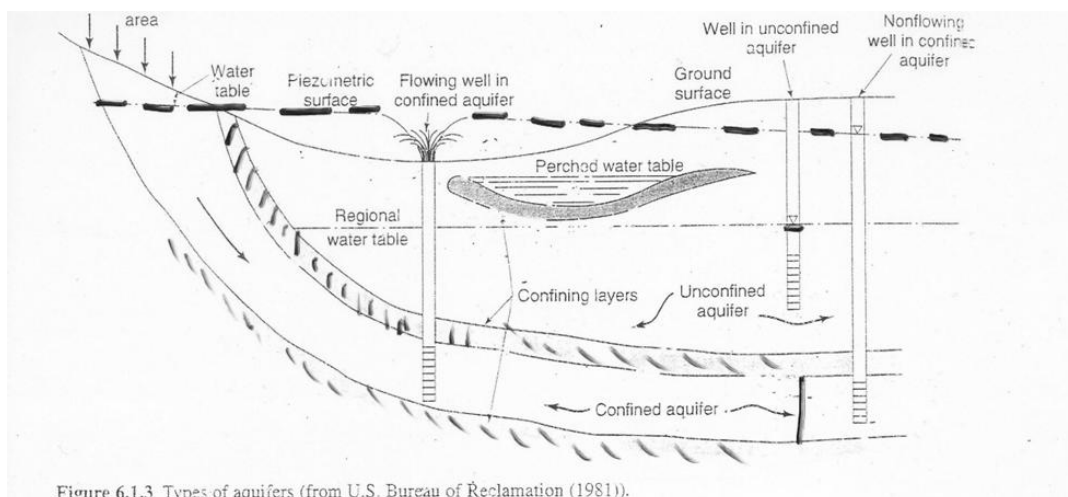


Figure 6.1.3 Types of aquifers (from U.S. Bureau of Reclamation (1981)).

FACTORS AFFECTING GROUNDWATER FLOW

Flow of groundwater depends on

- Hydraulic gradient
- Type of soil
- Soil porosity

Hydraulic Gradient: Like surface water, groundwater also requires slope (hydraulic gradient) to cause flow. To determine the hydraulic gradient and direction of groundwater flow *Hydrological Triangle Method* is used.

Type of Soil and Soil Porosity: The ability of water bearing stratum to store water depends on the porosity and the particle size of the stratum.

Porosities of common types of soil:

Top soil	37-65%
Clay	44-47%
Limestone	0.5-17%
Sand & gravel	35-40%
Chalk	14-15%

Remark: Clay is highly porous but its particles are so fine that is considered as impervious.

Remark 2: Sand & gravel are the most important aquifers.

The type of soil through which groundwater flows affect the quality of water because while the water flows through the soil, it takes some of the soluble gases and salts present in soil.

SELECTION CRITERIA FOR URBAN WATER SUPPLY

1. Purity of water
2. Volume of available water
3. Permanency of source
4. Elevation of water level with respect to area
5. Economic consideration