

SOURCES OF WATER:

All the sources of water can be broadly divided into

1. Surfaces sources and
2. Sub surface sources

The surface sources further divided into

- i. Streams
- ii. Rivers
- iii. Ponds
- iv. Lakes
- v. Impounding reservoirs etc.

NATURAL PONDS AND LAKES

In mountains at some places natural basin's are formed with impervious bed by springs and streams are known as "lakes". The quality of water in the natural ponds and lakes depends upon the basin's capacity, catchment area, annual rainfall, porosity of ground etc. But lakes and ponds situated at higher altitudes contain almost pure water which can be used without any treatment. But ponds formed due to construction of houses, road, railways contains large amount of impurities and therefore cannot be used for water supply purposes.

STREAMS AND RIVERS

Rivers and streams are the main source of surface source of water. In summer the quality of river water is better than monsoon because in rainy season the run-off water also carries with clay, sand, silt etc which make the water turbid. So river and stream water require special treatments. Some rivers are snowfed and perennial and have water throughout the year and therefore they do not require any arrangements to hold the water. But some rivers dry up wholly or partially in summer. So they require special arrangements to meet the water demand during hot weather. Mostly all the cities are situated near the rivers discharge their used water of sewage in the rivers, therefore much care should be taken while drawing water from the river.

IMPOUNDING RESERVOIRS

In some rivers the flow becomes very small and cannot meet the requirements of hot weather. In such cases, the water can be stored by constructing a bund, a weir or a dam across the river at such places where minimum area of land is submerged in the water and max. quantity of water to be stored. In lakes and reservoirs, suspended

impurities settle down in the bottom, but in their beds algae, weeds, vegetable and organic growth takes place which produce bad smell, taste and colour in water. Therefore this water should be used after purification. When water is stored for long time in reservoirs it should be aerated and chlorinated to kill the microscopic organisms which are born in water.

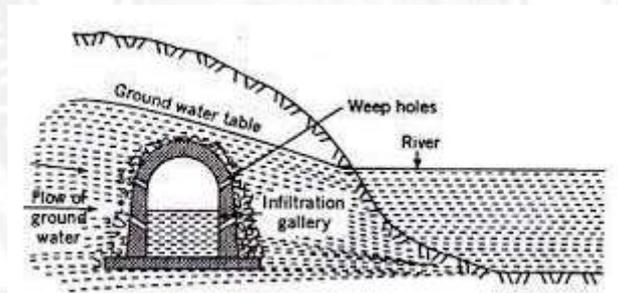
SUBSURFACE SOURCES

These are further divided into

- (i) Infiltration galleries
- (ii) Infiltration wells
- (iii) Springs etc

INFILTRATION GALLERIES

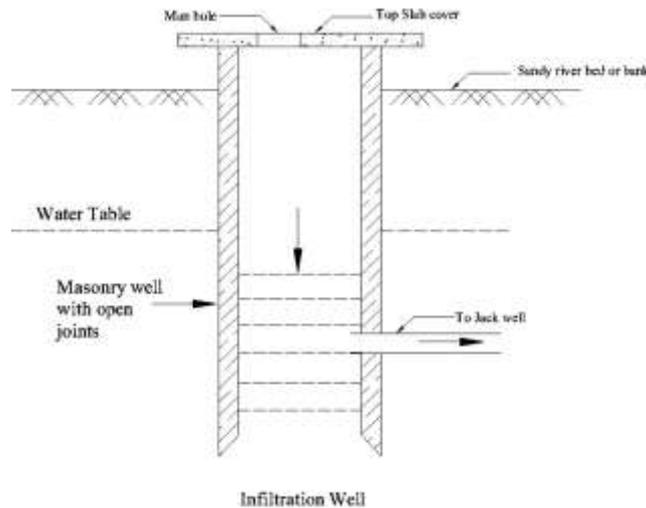
A horizontal nearly horizontal tunnel which is constructed through water bearing strata for tapping underground water near rivers, lakes or streams are called “Infiltration galleries”. The yield from the galleries may be as much as 1.5×10^4 lit/day/metre length of infiltration gallery.



For maximum yield the galleries may be placed at full depth of the aquifer. Infiltration galleries may be constructed with masonry or concrete with weep holes of 5cm x 10cm.

INFILTRATION WELLS

In order to obtain large quantity of water, the infiltration wells are sunk in series in the banks of river. The wells are closed at top and open at bottom. They are constructed by brick masonry with open joints.



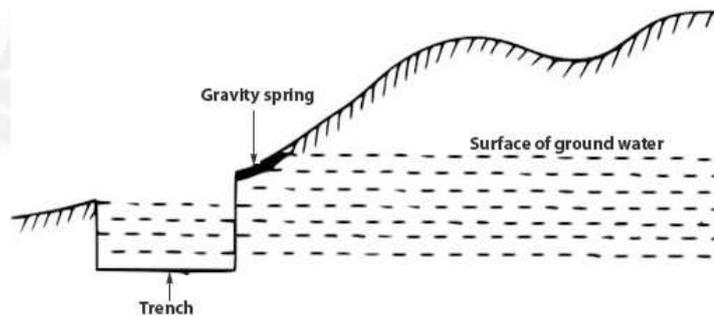
For the purpose of inspection of well, the manholes are provided in the top cover. The water filtrates through the bottom of such wells and as it has to pass through sand bed, it gets purified to some extent. The infiltration well in turn are connected by porous pipes to collecting sump called jackwell and there water is pumped to purification plant for treatment.

SPRINGS:

Sometimes ground water reappears at the ground surface in the form of springs. Springs generally supply small quantity of water and hence suitable for the hill towns. Some springs discharge hot water due to presence of sulphur and useful only for the cure of certain skin disease patients.

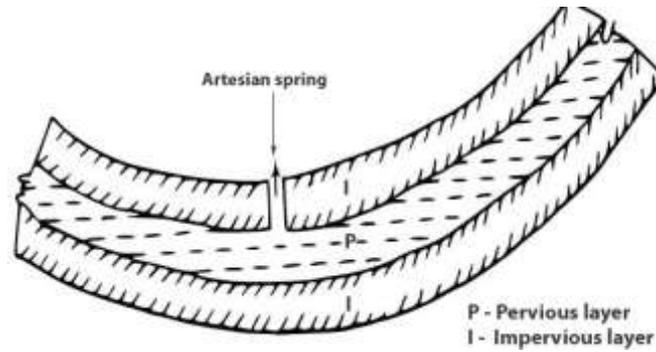
Types of springs:

1. Gravity Springs: When the surface of the earth drops sharply the water bearing stratum is exposed to atmosphere and gravity springs are formed



2. Surface Spring: This is formed when an impervious stratum which is supporting the ground water reservoir becomes out crops

3. Artesian Spring: When the ground water rises through a fissure in the upper impervious stratum when the water-bearing stratum has too much hydraulic gradient and is closed between two impervious stratum, the formation of Artesian spring from deep seated spring



WELLS:

A well is defined as an artificial hole or pit made in the ground for the purpose of tapping water. In India 75 to 85% of Indian population has to depend on wells for its water supply.

The three factors which form the basis of theory of wells are

1. Geological conditions of the earth's surface
2. Porosity of various layers
3. Quantity of water, which is absorbed and stored in different layers.

The following are different types of wells

1. Shallow wells
2. Deep wells
3. Tube wells
4. Artesian wells

Shallow Wells:

Shallow wells are constructed in the uppermost layer of the earth's surface. The diameter of well varies from 2 to 6 m and a maximum depth of 7m. Shallow wells may be lined or unlined from inside. . These wells are also called draw wells or gravity wells or open wells or drag wells or percolation wells. Quantity of water available from shallow wells is limited as their source of supply is uppermost layer of earth only and sometimes may even dry up in summer. Hence they are not suitable for public water supply schemes. The quantity of water obtained from shallow wells is better than the river water but requires purification. The shallow wells should be constructed away from septic tanks, soak pits etc because of the contamination of effluent. The shallow wells are used as the source of water supply for small villages, undeveloped municipal towns, isolated buildings etc because of limited supply and bad quality of water.

Deep Wells:

The Deep wells obtain their quota of water from an aquifer below the impervious layer as shown in fig No. The theory of deep well is based on the travel of water from the outcrop to the site of deep well. The outcrop is the place where aquifer is exposed to the atmosphere. The rain water entered at outcrop and gets thoroughly purified when it reaches to the site of deep well. But it dissolves certain salts and therefore become hard. In such cases, some treatment would be necessary to remove the hardness of water. The depth of deep well should be decided in such a way that the location of out crop is not very near to the site of well. The water available at a pressure greater atmospheric pressure, therefore deep wells are also referred to as a pressure wells.

